Vol. 4 TECHNOLOGY DEPT. DECEMBER, 1922 First Copy No. 9

THE PAPER INDUSTRY

The Monthly Educational Journal of the Paper Industry.

H. P. COE DRYING MACHINE CORP.
50 CHURCH ST., NEW YORK

MANUFACTURERS OF
MULTIPLE DECK ROLLER DRYING MACHINES

For All Sheet Products
From Wet Machines or Presses

Our Drying Machines will handle the largest and the smallest boards made by any process

We have a Special Dryer for quickly and economically eliminating the surplus moisture in Sulphite and other Pulps for shipment

Single Unit Installations

Can be assembled for very large output in feet or tonnage

Catalogues on Request

Estimates Promptly Furnished

Sheahan's Paper Carrier

(PATENTED)

Takes the Paper Automatically Through Dryers

Prevents Accidents *Saves Broke Paper* *No Missed Ends*
No Spearing Due to Missed Ends *No Shut Downs Due to Spearing*

ALL THESE INCREASE PRODUCTION

No Slack Paper On Dryers

Passes the paper at exact speed of dryers

Applicable to all kinds and makes of paper machines.

Following is a partial list of users. Please note the number of re-orders.

International Paper Co.	11	re-orders	News Pulp & Paper Co., Canada	1	
Paul A. Serg	1		Fuji Paper Co., Japan	1	
Sherman Paper Co.	1		Sakai Celluloid Co., Japan	1	
District of Columbia Paper Co.	1		Brompton Pulp & Paper Co., Canada	1	
Tidewater Paper Mills	2	re-orders	New York & Pennsylvania Co.	1	
Abitibi Power and Paper Co., Canada	7	re-orders	Crown Willamette Paper Co.	1	
Bryant Paper Co.	1		Fitzdale Paper Co.	2	re-orders
King Paper Co.	1		Spanish River Pulp & Paper Co., Canada	1	
Laurentide Paper Co., Canada	7	re-orders	Belgo-Canadian Pulp & Paper Co., Canada	2	re-orders
Finch Pruyn Co.	1		St. Croix Paper Co., Canada	1	
Wheelwright Paper Co.	1		Fitchburg Paper Co.	1	
Wausau Sulphate Fibre Co.	3	re-orders	Ontario Paper Co., Canada	1	
Price Brothers, Ltd., Canada	2	re-orders			

Send for Our Bulletin, "Dryer Group No. 11"

The Bagley and Sewall Company

WATERTOWN, NEW YORK
U. S. A.

"Without Wrinkles"

Just in case there may be someone in your organization whose noble brow is rigid with corrugations, we want to pass along this thought on worry, written by George Horace Lorimer a great many years ago when we really had something to worry over!

"The only thing I've ever put into my business which didn't draw dividends in fun or dollars was worry. * * * I've simply found worrying a blamed sight more uncertain than horse-racing—it's harder to pick a winner at it. * * * The time to do your worrying is when a thing is all over, and the way to do it is to leave it to the neighbors."

There are many "wrinkles" in the paper business.

Customers are particular. A wrinkled roll may be the cause of a whole set of human wrinkles—and losses to the mill.

Our Winders handle successfully all grades of Book, Tissue, News and Board.

We have a customer in New Hope who says that he makes about the hardest paper in the world to wind and he asserts that, with our Winder, "We have no trouble in getting a good hard roll."

"Perfect Rolls" such as our Winders are producing for a customer in Massachusetts imply saving of waste, saving of time, continued good-will of customers.

One of the great mills in the Kalamazoo district finds that our machines mean "less waste."

If you will soon be interested in a Winder, Slitter (and Rewinder) that will do its work "Without Wrinkles," it will give us pleasure to send you information and prices.

Four-Drum Winder in operation

The Moore & White Company

Established 1886

North Philadelphia Station, Penna. R. R., PHILADELPHIA, PA.

Paper Machine Builders

Vol. 4—No. 9

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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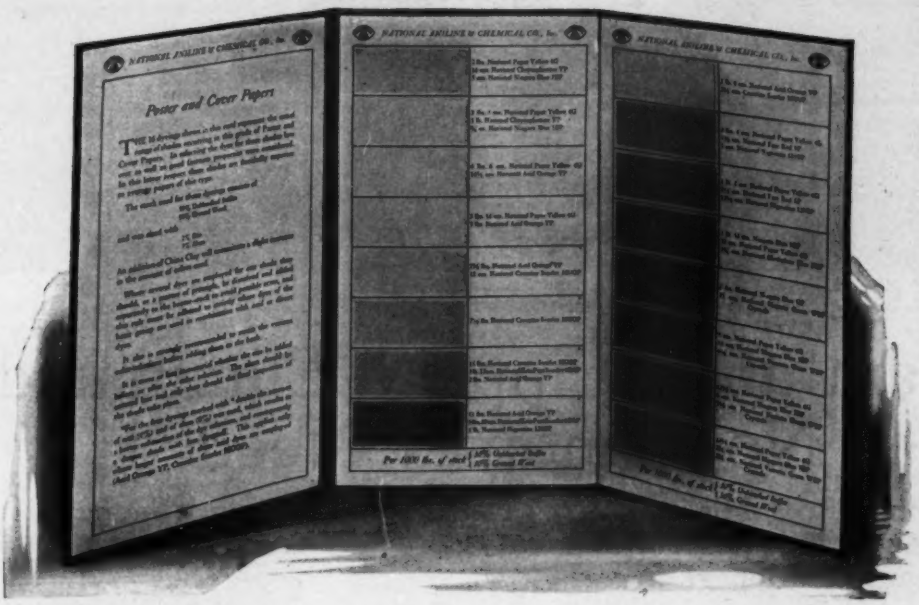
NATIONAL U.S.A. DYES



For Poster and Cover Paper

Economy is the keynote in the production of the colored papers shown in the new special color card issued by the "National" paper laboratory.

Sixteen paper dyeings in rich tones indicate the unusual effects that can be produced with the ordinary color range of Poster and Cover Papers.

The stock used consists of

50% Unbleached sulfite
50% Ground wood
sized with 2% size and 3% alum

In addition to their low cost, these attractive shades possess fastness properties decidedly superior to average papers of this type. The secret lies in the painstaking selection and careful blending of acid and direct instead of the use of basic dyes.

Securing unusual results with economy is a consequence usually accompanying the use of "National" service. This service is free to purchasers of "National" paper dyes.

National Aniline and Chemical Company, Inc.

40 Rector Street, New York, N. Y.

New York *Chicago* *Charlotte* *Toronto* *Philadelphia*
Boston *Hartford* *Montreal* *Providence* *San Francisco*

This view shows a typical paper mill equipped with ventilating pipes and ducts.

This view shows how the same mill appears with the ducts removed after installing Skinner Heaters.

Steam and Drippage Eliminated— No Canopies Needed

Install Skinner Bros. (Baetz Patent) Heaters and you can take out all canopies, pipes and ducts and still your mill will be properly warmed and totally free from steam, vapor and drippage!

One mill, where the drippage has been unusually severe, was described "dry as a bone" after the Skinner System was installed. In a mill in Maine there was no drippage present even with the temperature 40° below zero. In another mill where the steam has been so thick that it was impossible to see 8 or 10 ft., the air was as clear as a well ventilated office.

Positive in Operation—No Pipes or Ducts Used

The Skinner Bros. (Baetz Patent) Heater—the pioneer of its type—is simple and positive in operation. Air within the room, as well as from outside, is drawn into the heater by a powerful fan, warmed to a point where it holds moisture in perfect suspension and then forced out under gentle pressure through ventilators in the building.

Humidity is reduced to normal, and comfortable, healthful working conditions are continually maintained.

Used by Leading Paper Mills—Fully Guaranteed

Skinner Bros. (Baetz Patent) Heaters are used in many paper mills where steam or drippage elimination, air conditioning or heating offers a problem. Among them are:

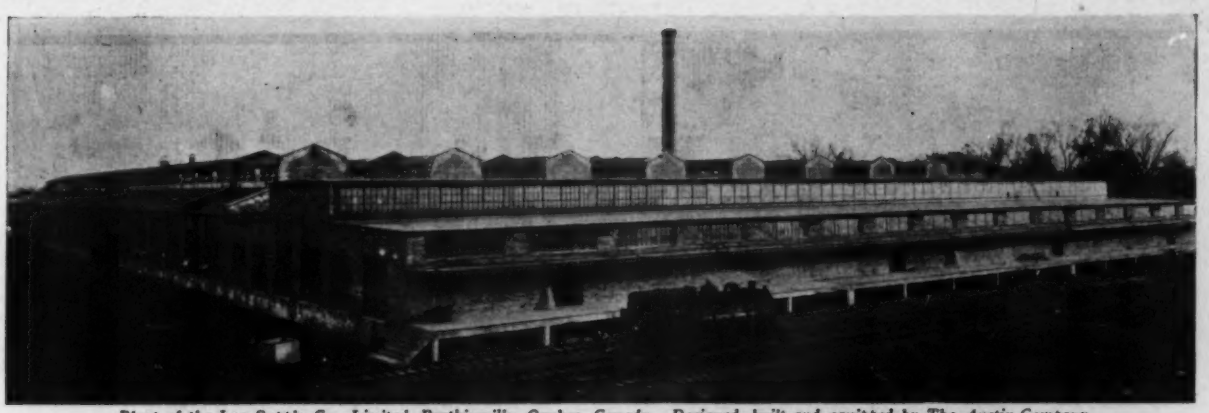
Crocker-Burbank Co., Fitchburg, Mass.
Certainteed Products Corp., East St. Louis, Ill.
International Paper Co.
Mt. Vernon Strawboard Co., Mt. Vernon, Ind.
Terre Haute Paper Co., Terre Haute, Ind.
Bulis Mfg. Co., Vincennes, Ind.
American Paper Products Co., St. Louis, Mo.
United Paperboard Co., Main Offices, New York City.
Installations in 12 branch mills.
Fairfield Paper Co., Baltimore, Ohio.
Castanea Paper Co., Lockhaven, Pa.
Dresden Paper Co., Dresden, Ohio.
Auglaize Box Co., St. Mary's, Ohio.
New York and Pennsylvania Co., Johnsonburg, Pa.
Adams Paper Co., Wells River, Va.
J. Strange Paper Co., Menasha, Wis.

Skinner Bros. (Baetz Patent) Heaters are fully guaranteed when installed as directed by our engineers. Write for further information

SKINNER BROS. MFG. CO., Inc.
Main Office: 1444 So. Vandeventer Ave., St. Louis, Mo.
Factories: St. Louis, Mo., and Elizabeth, N. J.

Boston, 465 Little Bldg.
Buffalo, 722 Morgan Bldg.
Chicago, 1723 Fisher Bldg.
Cincinnati, Ohio.
Cleveland, 632 Marshall Bldg.
Detroit, 328 Scherer Bldg.
Kansas City, 347 Lee Bldg.
New York, 1722 Flatiron Bldg.
Pittsburgh, 8 Wood St.
Spokane, 429 First Ave.
Washington, D. C., 734 Evans Bldg.

Skinner Bros.
Baetz Patent HEATING SYSTEM



Plant of the Log Supply Co., Limited, Berthierville, Quebec, Canada. Designed, built and equipped by The Austin Company.

Exterior of the Chillicothe Paper Company Plant at Chillicothe, Ohio, completely designed, built and equipped by the Austin Company.

Finished Storage Building interior, the Richardson Company Plant, Chicago

One of several buildings of the A. P. W. Paper Company, Albany, N. Y., erected by The Austin Co.

The following is a list of Austin clients in the paper, wood pulp and roofing industries:

Flintkote Company, Little Ferry, N. J.; Log Supply Co., Berthierville, Quebec; H. F. Watson Co., Chicago, Ill.; A. P. W. Paper Co., Albany, N. Y.; Arrowhead Mills, Fulton, N. Y.; Bogota Paper and Board Co., Bogota, N. J.; Continental Fibre Co., Newark, Del.; Chillicothe Paper Co., Chillicothe, Ohio; Hinde & Dauch Co., Sandusky, Ohio; Hammermill Paper Co., Erie, Pa.; National Fibre and Ins. Co., Yorklyn, Del.; Peninsular Paper Co., Ypsilanti, Mich.; Richardson Co., Cincinnati, Ohio, and Melrose Park, Ill.; Simplex Paper Corp., Palmyra, Mich.; West Carrollton Parchment Co., Dayton, Ohio; Oswegatchie Paper Co., Gouverneur, N. Y.; Ideal Corrugated Box Co., Parkersburg, W. Va.

Have More Floor Space When You Need It—Wherever You Need It

The Austin Company has repeatedly demonstrated its ability to deliver complete paper plants, pulp mills, plant extensions and alterations, and branch plants on schedule time—on a definite working-day basis.

Many Austin clients have taken advantage of profit opportunities by having new facilities delivered at the right time.

The Austin Company is now executing contracts for three manufacturers in the paper industry—for The Richardson Company at New Orleans (a repeat contract), The Oswegatchie Paper Company at Gouverneur, N. Y., and The Ideal Corrugated Box Company, Parkersburg, W. Va.

Wherever **you** may need additional buildings—floor space that will enable you to take advantage of profit opportunities an Austin Branch Organization offers you prompt building service.

There are ten Austin strategically located offices through which your building operations can be handled with dispatch wherever they may be located.

Consultation with Austin engineers involves no obligation. Phone, wire or use the coupon.

THE AUSTIN COMPANY, Cleveland

Engineers and Builders

CHICAGO, 1374 Continental and Commercial Bank Bldg.
CLEVELAND, 16112 Euclid Avenue
DETROIT, 1948 Penobscot Bldg.
PITTSBURGH, 493 Union Arcade
PHILADELPHIA, 1026 Bulletin Bldg.
NEW YORK, 217 Broadway
DALLAS, 627 Linz Bldg.
ST. LOUIS, 1794 Arcade Bldg.
SEATTLE, 1603 L. C. Smith Bldg.
BIRMINGHAM, 1317 Jefferson Bank Bldg.
THE AUSTIN COMPANY OF CALIFORNIA, 702 Pacific Electric Building, Los Angeles.

THE AUSTIN METHOD

AUSTIN

ENGINEERING BUILDING EQUIPMENT

P. I. 12-22

Gentlemen: We are interested in the erection of a..... building ..... stories high, and would be pleased to receive a copy of the new edition of "The Austin Book of Build-ings" without obligation. ☐ We are interested in branch plants and warehouses, and would appreciate receiving additional literature and information.

THE AUSTIN COMPANY, Cleveland

Firm.....

Individual.....

Address.....

Have You a Ventilating, Drying, or Air Conditioning Problem?

Air is just as essential to many manufacturing processes as it is indispensable to life itself.

As pioneers in the development of apparatus for the handling of air—in research to discover the laws governing its control—and finally in successful application of its products, the American Blower Company offers you the benefits of practical experience extending over a period of nearly a half century.

If you have a heating problem—an air conditioning problem—a drying problem—a ventilating problem—a mechanical draft problem—an air conveying problem—any problem which requires fan or blower equipment—bring it to the attention of our engineers who will cooperate with you in the selection of equipment that will do the work satisfactorily and economically.

We will gladly send you bulletins describing American Blower Products, including fans, blowers, air conditioning equipment, mechanical draft apparatus, steam engines, heaters and steam traps.

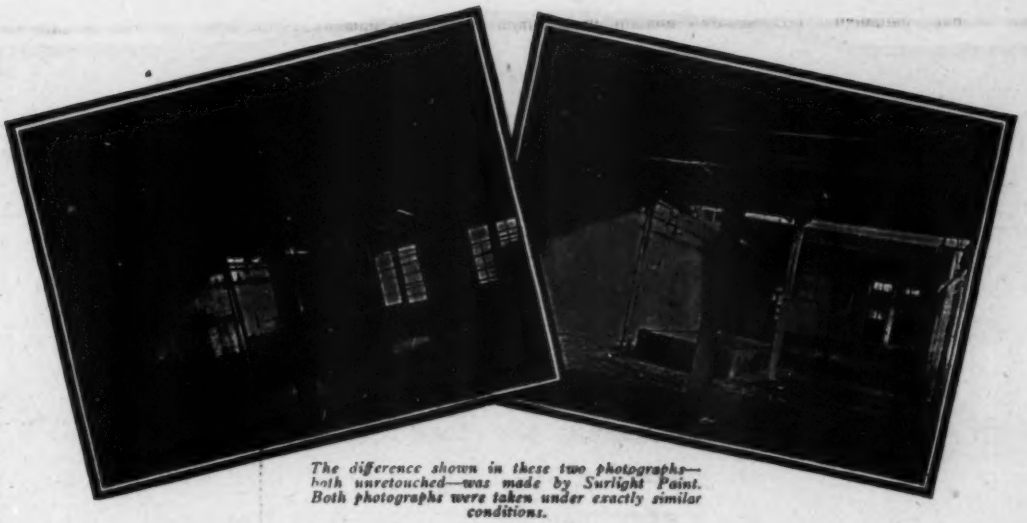
AMERICAN BLOWER COMPANY, DETROIT
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(172)

American Blower

"Sirocco" TRADE MARK

EXHAUSTERS · VENTILATING FANS · AIR WASHERS · BLOWERS · ENGINES
FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT



The difference shown in these two photographs—both unretouched—was made by Surlight Paint. Both photographs were taken under exactly similar conditions.

Pure White Paint—*Not* Near White

Surlight is the whitest interior paint made. This is an actual fact, open to demonstration—results will show, in every case, that under similar conditions and service, Surlight is whiter when applied, whiter when dry and stays white longer than any paint or enamel you can buy

Whenever you need *white* paint, buy Surlight. Because it is the whitest interior paint made, it has unequalled light-reflecting properties—totally free from blinding glare or dazzle. It provides a soft, restful light that makes better working conditions, increases production as much as 8 to 12%, reduces spoilage and prevents a large number of accidents which are due to faulty light conditions.

The *white*, clean appearance of Surlight promotes sanitation and discourages the common practice of allowing rubbish to accumulate in corners that are usually dark. Dust, dirt and flying particles do not readily adhere to Surlight because it has a hard, smooth surface which is non-porous and does not allow dust and dirt to get a "foothold." It can be frequently washed throughout its long life and its original tone quickly restored.

Surlight is long wearing. It is particularly valuable in mills and factories because it withstands vibrations, shocks and jars incident to the operation of machinery—it does not flake, chip, powder or fall off and spoil paper in any process of its manufacture. The extensive covering capacity of Surlight and its unusually good wearing qualities make it the least expensive mill-white paint, considered from any angle—cost per square of surface or cost per year of service.

If you once investigate Surlight you will always use it. We are ready to back any claims we make and invite you to write us for such information as you need—we will gladly mail you a list of Surlight users so you can make your own investigation.

Write for our De Luxe book "Surlight"—it tells the story of the whitest paint made. We also manufacture paints for all uses incident to the operation of paper mills.

ST. LOUIS SURFACER & PAINT CO.
4204 Arlington Ave. St. Louis, Mo.

SURLIGHT

The Light Reflecting Wall Paint for Industrial Purposes

Bringing Home the Paper Mill's Better Ventilation—

IN PARCHMENTVILLE, a district of the city of Kalamazoo, live those who toil in the big mill of the Kalamazoo Vegetable Parchment Co.—mill hands and executives having many common interests, regardless of title or size of pay check. The beautiful Community House, just completed, will afford the dwellers of the community an opportunity for "getting together" for profitable instruction and good, wholesome entertainment. A place where all may meet upon an equality; and where one may enjoy the companionship and fellowship of the others. The community house has many features that will work for greater efficiency among the workers, including a cafeteria and a complete motion picture outfit.

The selection of a Clarage Fan for this building is significant. To build the best community house that could be built it was necessary to use throughout the best equipment that could be had. The builders knew from their experience in paper mill ventilation that nothing was more important than ventilation—so probably nothing received greater attention than the choosing of fans.

And a Clarage Multiblade was adopted!

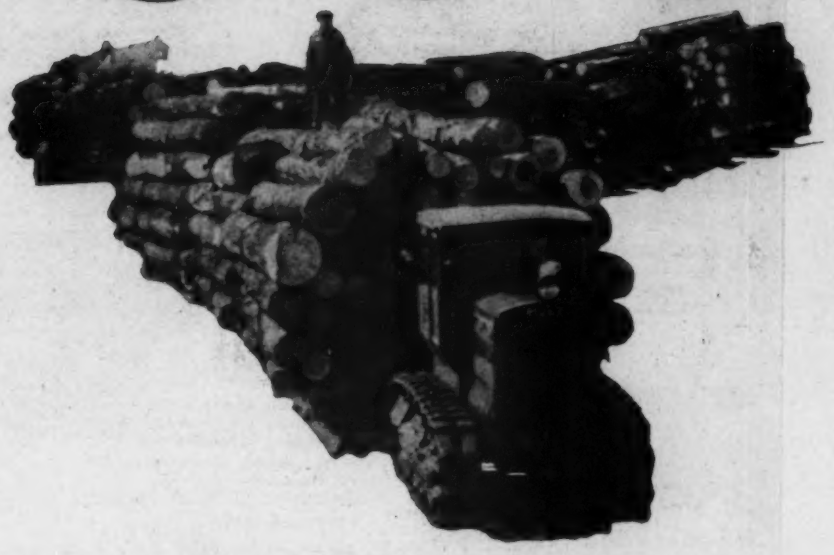
The reasons why Clarage Fans were chosen for this building, and why, in paper mills, they are solving problems of roof drying, moisture absorption, paper stock conveying, calender roll cooling and mechanical draft are told in the bulletins.

Write—

Clarage Fan Company, Main Offices and Factory: Kalamazoo, Mich.

Branch Offices in Principal Cities

CLARAGE—KALAMAZOO Multiblade Fans



For logging small timber stands at a profit

The "Caterpillar's" field of usefulness is by no means limited to logging. There is a "Caterpillar"* of size and capacity for every power need. On farm or ranch, in the mining and oil industries, for building and maintaining roads, removing snow and doing other civic work — wherever tractive power and endurance are at a premium, the "Caterpillar"* has no real competitor.*

CATERPILLAR
Reg. U.S. Pat. Off.

HOLT
PEORIA, ILL.
STOCKTON, CALIF.

The Northern "Caterpillar"* Logger provides the equivalent of a logging railroad. It also gives access to the scattered outlying tracts of timber too small to justify the expense of putting in a railroad. It does its own swamping and hauls over snow roads with the same pronounced success as on ice roads. With "Caterpillars"*, jobbers and loggers of small stands can profit by the same economies gained by the big lumber and pulpwood manufacturers using large fleets of these dependable, all-purpose tractors.

Extremely powerful, yet compact in build, the Northern "Caterpillar"* Logger is easy to operate both on and off the road. It turns in its own length and will work continuously in the most severe winter weather. After a big snowfall, it quickly plows through the drifts and gets logging traffic moving. The three-speed transmission of the "Caterpillar"* enables it to climb steep grades and to travel at high speeds when hauling on level roads or making return trips.

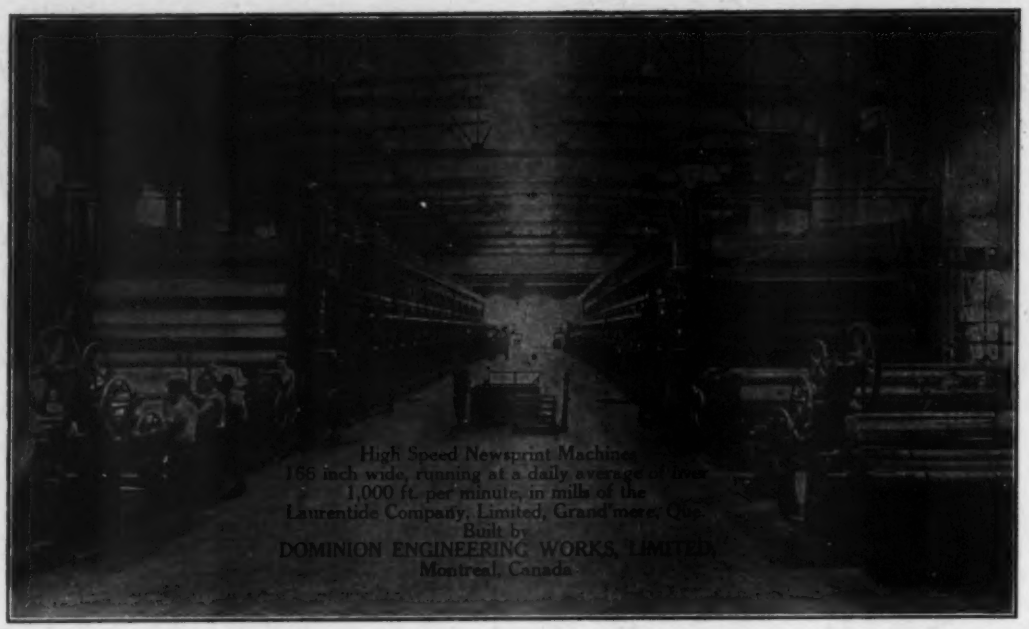
Whether used for swamping out roads, skidding logs, spotting and fetching out sleighs, or hauling trains, no other method is so practical and so economical as the "Caterpillar"* method. Our motion pictures, exhibited on request, show the Northern "Caterpillar"* Logger at work in the woods. We maintain complete stocks of spare parts. Write today for descriptive catalog.

**There is but one "Caterpillar"—Holt builds it*

The Holt Manufacturing Co., Inc.

PEORIA, ILL.

Complete service stocks carried at: Duluth, L'Anse, Mich., Butternut, Wis., Rhinelander, Wis., Minneapolis, New York, Bangor, Montreal, Quebec, Spokane.



High Speed Newsprint Machine
166 inch wide, running at a daily average of over
1,000 ft. per minute, in mills of the
Laurentide Company, Limited, Grand'mere, Que.
Built by
DOMINION ENGINEERING WORKS, LIMITED
Montreal, Canada

Improved Quality and Increased Production

can be secured in many paper mills today by a judicious remodelling of machines and replacement of earlier types of wet ends, couch rolls, etc., by present-day designs which allow higher speeds.

We specialize in re-designing existing paper machines and installing equipment which will bring them into line with the many modern machines which have gone into operation lately. To get our figures and suggestions as to possible betterments in your machines will not obligate you in any way, and may lead to important savings. Our Engineering and Sales Departments are always glad to co-operate with those who have paper production problems to work out.

Fourdrinier Machines for Fine Papers, Fast-running Machines for Newsprint or Kraft, also Cylinder Machines for Board, etc., and Wet Machines for Wood Pulp.

Millspaugh Suction Couch and Press Rolls, Granite Press Rolls, Rope Reels, Screens, Centrifugal Pumps, etc.

I. P. Morris Hydraulic Turbines and Pumps.

Larner-Johnson Hydraulic Valves in types to suit various requirements and in all sizes up to 20 ft. diam. Gate and Pivot Valves in the larger sizes. Electric Steam Generators.

Dominion Engineering Works, Limited

Telephone Melrose 700

Montreal, Canada

Cable Address "Domworks Montreal"

R. F. Mather, Western Representative, London Bldg., Vancouver, B. C.

(M-84)

WE CAN'T get away from it. Christmas with its pleasant surprises, its thrills and excitement for the youngsters, and its joyous family reunions, is almost due. Every morning the advertising in our newspaper tells us with an increasing clamor that it is only a few more days until Christmas. No sir, we can't get away from it; and any desire to do so vanishes with our better thought—we don't want to get away from it.

The Christmas season has come to mean something to us. It is an asset—not a liability. Narrow is that man who sees only the sum it costs him to remember his employees and other business friends. Worse than narrow. We would call him miserable. Christmas *is* a liability to such a man. Yet, in spite of a few miserably narrow men, we dare to enthuse over Christmas and call it an asset.

We hesitate, however, to analyze—to investigate wherein Christmas is a business asset. We hesitate in fear that familiarity with fundamentals may dim the charm of this glorious season. We hesitate at the sage warning that familiarity breeds contempt; but might we not add that it breeds contempt only for contemptable objects? Let us therefore discover wherein Christmas is, or at least should be, an asset—a business asset.

"Peace on Earth—Good Will Toward Men"

This, the angelic slogan of Christmas, is a wonderful ideal. It is, in fact, more than an ideal. It had to be or it would not have appealed to the generations. We are business men and in our business there is not much room for sentimentalism or pure idealism. Indeed not! We have a belief that were it not for the sound business fundamental expressed in this Christmas slogan, it would have been filed away for future reference long ago, instead of becoming a living, vital, universal influence.

Every man who has made any kind of a success today realizes the immense value of a mutual "Good Will Toward Men." And is there any time when it is more apropos to establish a generous, wholesome feeling of mutual good will for our fellow men—employers, employees, clients and customers—than during the Christmas season?—when good will is a part of the very atmosphere—when it is expressed in a hundred different ways, and every sincere expression finds a warm reception? It is the one time of the year when the rigid tension of business relaxes enough to allow the co-mingling of expressions of appreciation for past favors—expressions that fill even a business man's heart with an exhilaration that will carry him far into the months of stern business.

Such a season—the greatest time of the year for the establishment of good will among all with whom we share respect and have to do business—is surely a business asset.

We wish at this time to express our heartfelt appreciation to the multitudes of paper mill men who read THE PAPER INDUSTRY, therby inspiring us to secure the best articles available from writers in this country and others as well. And we want to say "thank you" to our advertisers, who in turn have shown, in a substantial way, their appreciation for the thorough covering THE PAPER INDUSTRY accomplishes in the pulp and paper mill field.

With a sincere good will, we wish you all a Merry Christmas.

We were PIONEERS in making
OSCILLATING, NON-SCORING
FOURDRINIER WIRES

This is one reason why
"Appleton Wires Are Good Wires"

Fourdrinier Wires
Cylinder Wires
Washer Wires
Of brass or bronze

APPLETON WIRE WORKS
Appleton, Wis., U. S. A.

For years the study of felt manufacturers has been the construction of a board felt combination to give smoother finish and greater production with less trouble.

KENWOOD ONE SIDED BOARD FELTS SOLVED THIS PROBLEM

They were the first successful application of this type of weave to the large board machine running at high speed. They have passed the period of experimentation and today are unexcelled.

—in the finish they produce.
—in daily production during life of felt.
—in length of life.
—in freedom from such troubles as curling edges, uneven width, stretching and blowing.

Kenwood One Sided Bottom Board Felts will not only produce board with a better finish but board with a **higher test.** This is due in part to the greater water removal and in part to the more even caliper of board produced by these felts.

Kenwood One Sided Superfine Top Felts give wonderful results in life, in finish and in high daily production. This felt is truly **superfine,** being made of fine yarns spun from the choicest quality of wool suited to the purpose selected from the best fleeces grown.

Kenwood One Sided Fine and Super Press Felts

eliminate the necessity for heavy, close, expensive plate and B. B. press felts on 2nd, 3rd and 4th presses. Kenwood One Sided Fine and Super Press Felts give the required finish at a higher rate of production and cost much less. There is also less interruption for washing, etc.

Clothing Recommended for Board Machines

The experience and practice of some of the largest and most successfully operated board mills of this country recommends the following clothing for board machines.

Bottoms: Kenwood One Sided Bottom Board, Design 212.
Tops: Kenwood One Sided Superfine Top, Design 187.
2nd Press: Kenwood One Sided Fine Press, Design 18M.
3rd Press: Kenwood One Sided Fine Press, Design 18M.
4th Press: Kenwood One Sided Superfine Press, Design 223.

For conditions more severe than the average, and for machines that are not in the best condition, we recommend the use of Kenwood Plain Bottom Felt, Design 196, and Kenwood Top Felt, Design 176, leaving presses as above.

The advantages of the Kenwood One Sided weave are offered without any advance in price. Only where finer weaves and finer yarns are made necessary either in One Sided or plain weave felts, are extra prices charged.

F. C. HUYCK & SONS

KENWOOD MILLS, Albany, New York
KENWOOD MILLS LTD., Arnprior, Ontario, Canada

$1,200,000

Southern Paper Company

First Mortgage 6½% Sinking Fund Gold Bonds

Dated December 1, 1922 **Due December 1, 1937**

Principal and interest (June 1 and December 1), payable in Chicago.. Denominations $1,000 and $500. Redeemable at option of Company on sixty days' published notice up to and including December 1, 1927, at 105 and interest; from December 2, 1927, to December 1, 1932, both inclusive, at 102½ and interest; after December 1, 1932, at 101½ and interest. Total authorized issue $1,500,000. Interest payable without deduction for Federal Income Tax not in excess of 2%.

Listed on the Chicago Stock Exchange

CONTINENTAL AND COMMERCIAL TRUST AND SAVINGS BANK, CORPORATE TRUSTEE

The following information is summarized from letters of Mr. J. L. Dantzler, President of Southern Paper Company, and Mr. Geo. F. Hardy, Consulting Engineer, New York:

BUSINESS: Southern Paper Company, incorporated in 1911 under the laws of the State of New York, is engaged in the manufacture and sale of kraft paper. It owns and operates at Moss Point, Mississippi, a modern pulp and paper mill, having a present daily capacity of about forty tons.

PURPOSE OF ISSUE: The proceeds of these bonds will largely provide for certain additions to the plant, including installation of one more paper machine, which will increase capacity to one hundred tons per day.

SECURITY: This issue of $1,200,000 bonds will be secured by a first mortgage on land, buildings, machinery, equipment and other fixed assets, which upon completion of the additions referred to above, will have a value, as estimated by Mr. Geo. F. Hardy, Consulting Engineer, New York, of not less than $2,800,000.

CURRENT ASSETS: The Company's balance sheet as of November 4, 1922, shows net current assets of $542,192. So long as any bonds of this issue are outstanding, the Company covenants not to pay cash dividends on its common stock except out of income accumulated subsequent to November 4, 1922.

EARNINGS: For the six calendar years, 1916 to 1921, inclusive, profits of the Company available for interest, after depreciation and all charges except Federal taxes, averaged over $294,000 per annum or more than three and three-quarters times interest charges on the $1,200,000 bonds to be presently outstanding. The Company anticipates that enlargement of the plant to over twice its present capacity will be reflected in substantially increased earnings.

SINKING FUND: An annual sinking fund is provided beginning December 1, 1925, in amount sufficient to retire 50% of said $1,200,000 bonds before maturity, either through purchase at not to exceed the prevailing redemption price, or if not obtainable, by call at said price.

MANAGEMENT: Operations have been under the direction of interests which for many years have been identified with the paper and lumber business.

Price 100 and Interest, Yielding 6½%

Bonds are offered for delivery when, as and if issued and received by us and subject to approval as to legality by Messrs. Mayer, Meyer, Austrian & Platt, Chicago.

BOND DEPARTMENT

Continental and Commercial Trust and Savings Bank

CHICAGO

The above statements are not guaranteed but are based on information which we believe to be accurate

The Forecast of 1923 Conditions

FORECASTING the commodity market is, under normal conditions, more or less hazardous, but under the backwash of the war conditions, was not only extremely hazardous but a thankless task. Even some of our best market authorities and agencies refused to put out any forecast, and contented themselves with giving a resume of the conditions after the movements which produced the changes had taken place. That is not forecasting. Our weather bureau would be of small service to the mariner, agriculturist, and citizen at large if it contented itself with telling about the storms and fair weather that had passed, and did not forecast the weather conditions that were to come; so that the mariner, agriculturist and citizen at large could guide his future operations with a definite certainty of the weather conditions he was liable to experience.

We are minded to indulge in these musings at this time because the end of the 1922 trail is in sight. Within twenty days from the printing of this issue of The Paper Industry the record will be completed, closed, and passed into history. We recall to the minds of our readers that in the March issue we started a series of trade articles forecasting the movement of the paper market. We began by analyzing the situation and set forth the basis from which we were predicting a rising market, and for six months following, up to and including August 1922, we advised all consumers and jobbers of paper to lay in their supplies. We began in March with the admonition "Buy Now", and every month we reiterated the same message.

It is a matter of some pride to us that our diagnosis and advice was right, particularly so when we remember that we were alone among the paper trade journals during those months in setting forth the optimistic side of the market and urging the trade to take advantage of the profitable advance that was due and which did materialize as we forecasted.

We had occasion recently to compare Dun's index number of a year ago with the present index number and found that the general upturn in all commodity prices shows a rise of fully 15%. Now this advance is a healthy one and in all probability will be maintained for sometime to come. What caused it primarily? The answer is the advance in labor.

Labor has advanced in the last year over 20% and as labor constitutes fully 75% of the total cost of all commodities it was inevitable that the commodities should thus show an advance of 15%. We must remember, and labor must learn, that the only way an advance in labor can be made is to charge it into the commodity prices, which advanced prices labor has to pay as well as the employing, agricultural and other classes of consumers.

As long as labor is fully employed and the demand for it equals the supply, or is a little greater than the supply, wages and salaries will remain stable, with a tendency to advance, and thus commodity prices will remain stable with the same advancing tendency.

We didn't start this article with the idea of doing any more forecasting this year. We thought only of indulging in a little year's end self glorification, but we can't help taking one more fling ere the year ends, with this bit of forecasting for 1923:

Watch the labor factor during the coming year!!

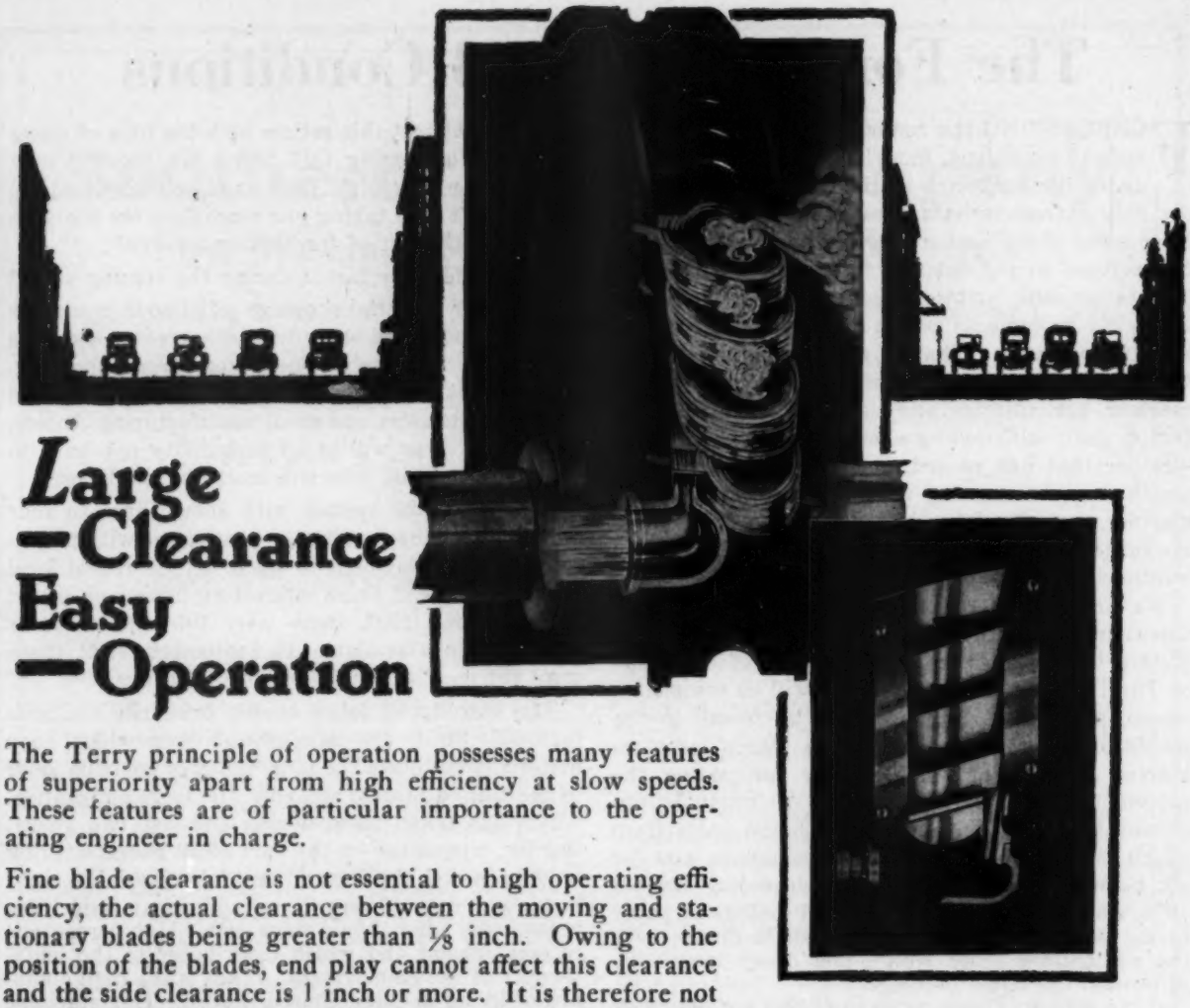
There is a material shortage of labor in numerous industries now, and there will be a greater shortage next year. This is no local, temporary shortage. Next year it will develop that there is a shortage in all lines of industry and in all manufacturing centers. Labor next year will in all probability not have to seek jobs, but the jobs will hunt out the laborer.

The year 1922 opened with some three to four million unemployed men; the year closes with practically no unemployment to speak of. A recent local authority put out these interesting figures on labor: In September, 1921, there were 195 applicants for every 100 jobs available; in September, 1922, there were 101 men available for every 100 jobs.

The scarcity of labor is due primarily to three factors: First, the immigration laws which have materially cut down the large influx of common labor to the United States; secondly, the large emigration, which has taken place during the last two years; thirdly, compliance on the part of all manufacturing industries with the demand that labor work but eight hours per day. There is an additional underlying reason why labor should show such a high percentage of employment and which contributes to the maintenance of the employment. That is the high standard of living in these United States. This standard is higher than anywhere in the world. It is the consensus of opinion of both employers, laborers and consumers generally that this high standard should be maintained. Out of the war and the result of the war has come the beneficent policy of taking into account the cost of living in the setting of wages and salaries in this country.

It must be apparent to every thinking man as well as to every economist that to change the present situation and to have any decrease in the cost of production there must be more laborers, for without more laborers or more labor-saving machinery and a higher rate of production there can be no lowering of costs, and even though the lowering of costs may come by larger production it does not necessarily mean a lowering in the compensation to labor.

Finally, it must also be apparent that with labor so generally employed and so amply compensated, their purchasing power has thereby been enlarged and, therefore, the consumption of manufactured commodities extended. This is the condition of paramount importance in 1923. It is the condition that in all probability will make for the return to normal, which means the easy exchange of one class of commodities for another at a profit, and at about the present level of prices. This is our forecast—we give our reasons—we ask no thanks, but we bid you watch for the result.



Large —Clearance Easy —Operation

The Terry principle of operation possesses many features of superiority apart from high efficiency at slow speeds. These features are of particular importance to the operating engineer in charge.

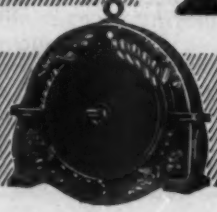
Fine blade clearance is not essential to high operating efficiency, the actual clearance between the moving and stationary blades being greater than ⅛ inch. Owing to the position of the blades, end play cannot affect this clearance and the side clearance is 1 inch or more. It is therefore not essential to make frequent adjustments of the thrust to maintain efficient and safe operation.

Clearances in the Terry blading may be reduced only by excessive wear of the main bearings, but even if this should occur, the projecting rims on the sides of the wheel would rub on the smooth protecting surfaces of the reversing chamber, thereby automatically stopping the turbine, before damage could result. Replacement of the interchangeable bearings immediately restores the original clearance.

For a turbine, which frees the operator from worry—*specify*

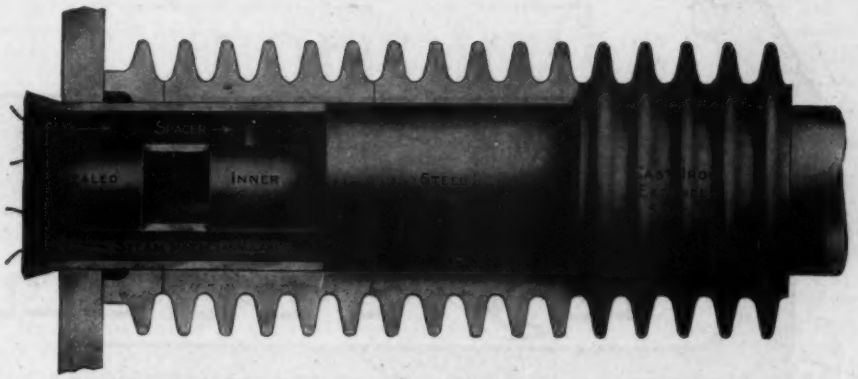
T 75

THE TERRY TURBINE



Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.



Foster Protected Surface

WHILE a superheater is a relatively small part of a power plant, its reliability determines its continued operation and is therefore important.

The reliability of Foster Superheaters is assured by the well known Foster protected surface, consisting of a steel tube for strength and cast-iron protecting rings for ruggedness and greatest possible superheating surface.

The outer cast-iron surface not only steadies the degree of superheat obtained, but also prevents burning out of the superheater elements and protects the steel tubes from the corrosive effects of the furnace gases. The protection which it affords is so complete that the life of a Foster Superheater is greater than that of the boiler to which it is attached.

The reliability of Foster Superheaters is being proven daily in thousands of power plants all over the country. Send for the Foster Superheater Book. It explains in detail the benefits of superheat and describes the Foster patented construction that assures these benfits with greatest reliability and least maintenance expense.

Power Specialty Company

General Offices: 111 Broadway, New York

Boston, Philadelphia, Pittsburgh, Chicago, San Francisco, Dallas, Kansas City, London, England

Works: Dunsville, N. Y., Egham, England

Advantages of Foster Superheater Construction

1. Steel for strength, cast-iron for durability.
2. Four to six times as much heat-absorption surface as obtained from bare tubes.
3. Reserve heat stored for sudden demands.
4. Steam stays close to the hot tube surface.
5. Great flexibility of design.

"The Superheater with the extended Surface." Over 10,000 installations.

FOSTER SUPERHEATERS

35

MATHIESON System

Bleach Liquors from Liquid Chlorine

YOUR present facilities are readily adaptable to the use of the Mathieson System.

Developed by Mathieson engineers, this system is a revolutionary improvement over the old Chloride of Lime method of preparing bleach liquors.

A few of its advantages are:

Solutions uniform in strength and of any desired concentration.

Prevents formation of chlorates and over-chlorination.

Requires no additional equipment outlay.

Eliminates complicated valves and control apparatus.

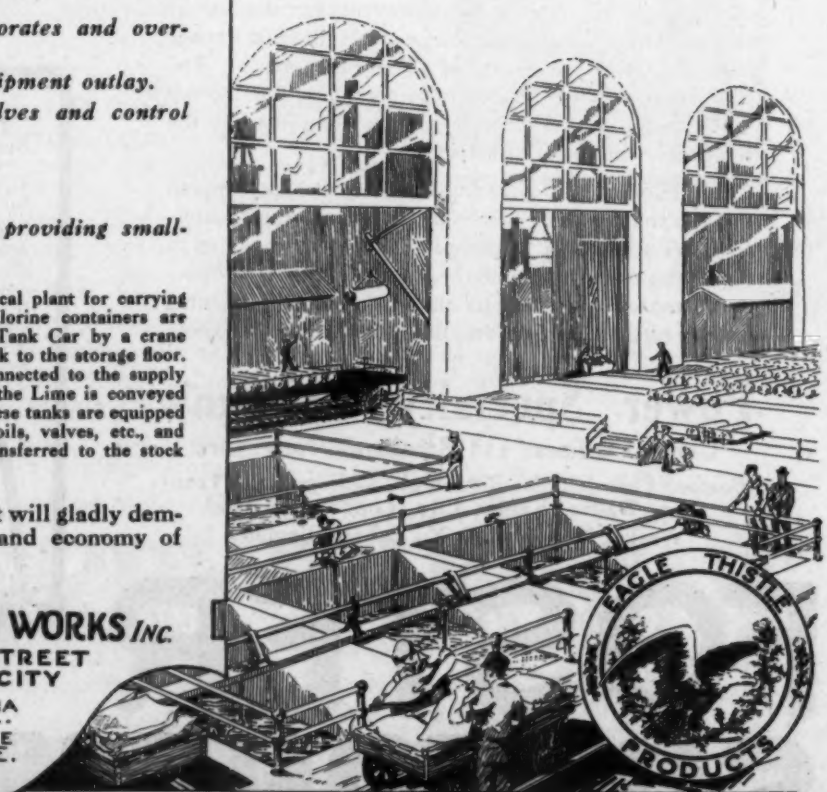
Simplifies operation.

Is more economical.

Increases safety factor by providing small-unit Chlorine storage.

The illustration represents a typical plant for carrying out this system. The one-ton Chlorine containers are unloaded from our Multiple Unit Tank Car by a crane and transferred on an industrial truck to the storage floor. The containers, as required, are connected to the supply pipes leading to the mixing tanks; the Lime is conveyed by means of an industrial truck. These tanks are equipped with the usual pumps, expansion coils, valves, etc., and the liquor, when settled, can be transferred to the stock tanks by the circulating pumps.

Our Technical Department will gladly demonstrate the greater safety and economy of this system.



MATHIESON ALKALI WORKS INC.
25 WEST 43rd STREET
NEW YORK CITY
PHILADELPHIA
··CHICAGO··
PROVIDENCE
CHARLOTTE.

Deal Direct with the Manufacturer

EDITORIALS

Paper Exposition Proposed

THERE has been of late some talk of a paper exposition to be held in connection with the spring convention of the American Pulp and Paper Association.

When one considers that the paper industry is at present passing through one of its greatest periods of development, the potentialities of such an exposition become very obvious, for, gathered under one roof will be equipment built by specialists who have devoted their lives to the improvement of some particular phase of this important industry. The focusing of these specialized efforts covering every detail in the manufacture of paper will afford an opportunity for the progressive paper manufacturer to sense something of the rapid progress which the paper industry has made during the past few years, and is still making. It will provide an incentive for such a man to get into the stride which is rapidly bringing paper to the front in the industrial world—to the front where it most certainly should be. It will enable this man to make better paper and to go about making it with more intelligent understanding of how to make it at a profit.

Aside from the benefit to the manufacturers of paper, such an exposition, if given ample publicity, will react in a greater demand for papers of good quality.

We have long wondered whether the public—the ultimate and great consumer of paper—is alert or even concious of the paper with which it is in almost constant contact. We have concluded in our mind that the public does not even know what constitutes paper or paper quality. Is it not, therefore, time for an exposition where this public will be enlightened upon some of the hitherto mysteries of papermaking? Paper is constantly in the hands of this public, and, if it can be aroused to an intelligent understanding of it the reaction will be a demand for more and better paper.

The proposed paper exposition, with its display of paper-making machinery and its exhibition of numerous new processes, should, by means of education, sow the seed for a vast public interest in paper.

A Safety Code

FOR some years there has been considerable effort put forth by various organizations for the safety of men working in the different industries. Possibly the greatest power for good in this direction has been the National Safety Council, with headquarters in Chicago. Several years ago the American Engineering Standards Committee assigned to the National Safety Council the work of formulating a safety code for paper and pulp mills.

Much work has been done along these lines and a Safe Practices-Pamphlet was prepared, and a second one was planned, but so far this has not been carried out. A sectional committee has now been appointed to prepare a practical and workable code, that will be of the greatest helpfulness in the industry.

The men on this committee are doing a big work for the paper industry, but they need the assistance of other men. The departments on which much further information is needed are those of rag and old paper preparation, sulphate process, and qualifications and duties of employees. In the January issue will appear the proposed "Safety Code for Paper and Pulp Mills," and by reading this article, it will be noted that the requirements as outlined under the first two headings do cover the field and have passed inspection by those who are familiar with these processes and operations. The committee feels, however, that certain sections are not complete, and invites the special attention of the readers of THE PAPER INDUSTRY to freely contribute their thoughts on these subjects.

It is the hope of the publisher of THE PAPER INDUSTRY that there will be a hearty response to this appeal by the committee, and that the final code, as worked out, will be the means of considerably lessening the number of injuries and deaths in our great industry.

Reduce the Postal Charges

THE manufacturer of pulp and paper has one tremendous burden which most of them know little about. True, this great burden is a somewhat indirect one, but its effects reach farther than many of the seeming direct burdens.

We refer to the excessive postal rates that are demanded by the Government on all classes of publications—trade papers, magazines, newspapers, etc. The postal rates on these publications have advanced from 100% to 900% since pre war times. This excess in mailing costs has meant the elimination of many publications and the lessening in numbers of many others, with the consequent usage of considerable less tonnage in paper than would have been the case had this not been so.

The Kelly bill, now before Congress, proposes to reduce this excessive charge by taking off the last two advances, which should still make the rates about 175% of what they were before the war started.

No publisher wants to get away from his rightful share of the war burdens, but they do want to be relieved somewhat of this discriminating charge, which not only hurts the publishing business, but the paper manufacturers as well.

If there is any business in the world that should be favored by a democracy, it is the distribution of literature and information, but instead of favoring such distribution, the Government has placed an almost prohibitive tax on magazines, trade papers, newspapers, etc., which are the greatest source of education outside of the public schools.

There is no reason why publishers alone should bear this crushing weight of war taxes, and this means the paper manufacturers also, when practically all other industries have been relieved at least to some degree of their burdens.

We do not believe in propaganda in many cases, but we do feel that every man who has the best interests of the paper industry at heart, should consider that this is a matter of vital importance to him, and for him to use every reasonable effort to see that the Kelly bill receives the sanction of Congress.

IT IS NOT A QUESTION OF JOINTS

AT ACIPCO, the art of making cast iron pipe has progressed. There are Acipco pipe joints adaptable to a wide range of service and construction conditions. The paper or pulp mill man may use the particular joint to fit his needs and still have the durability of cast iron piping.

The durability of Acipco cast iron piping is important. A paper or pulp mill superintendent or manager whose mind and attention are distracted by piping troubles cannot be expected to make production records. A superintendent or manager is employed to make pulp and paper. It is poor business to handicap him with deficient piping as a substitute for Acipco cast iron.

You may need flanged pipe and fittings, or standard bell and spigot, or Prepared Joint bell and spigot, or Simplex Low Pressure Piping or Simplex Prepared Joint Five-Foot Pipe. Our Engineering and Research Departments will welcome an opportunity to study your requirements and co-operate with you.

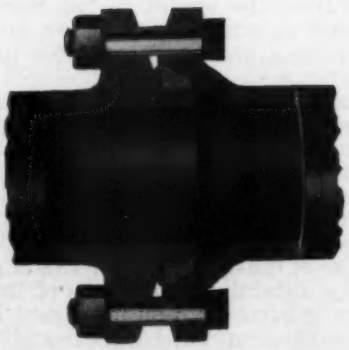


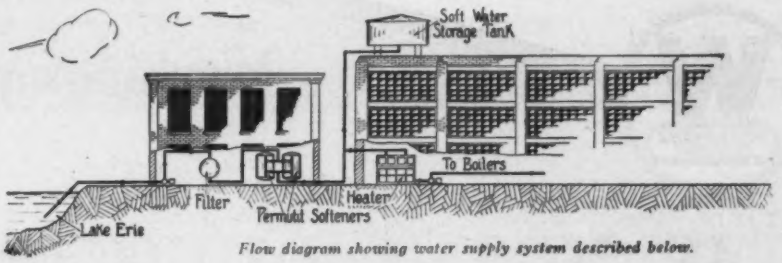
Illustration of section through assembled joint of Simplex Prepared Joint Five-Foot pipe, showing asbestos endless ring gasket in place. This gasket is adapted to use for oil, vapor and acid lines. For water and gas lines, the gasket is made of lead and jute. A rubber gasket is compounded to suit the particular service it is to render—steam, natural gas, artificial gas, water, oil, etc.

Write for Illustrated Catalogue "P"

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM, ALA.

DISTRICT OFFICES IN PRINCIPAL CITIES



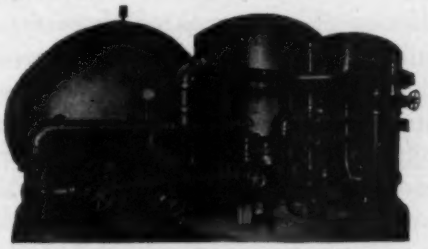
Flow diagram showing water supply system described below.

Not a Single Boiler Tube Replaced in 4800 H. P. Boiler Plant Since 1920

A large industrial corporation in Buffalo, N. Y., operates a boiler plant consisting of six Stirling, vertical water tube boilers that develop an average of 4800 H. P., 24 hours per day the year round.

The water supply used for boiler feed purposes is derived from Lake Erie, and besides having variable amounts of sludge and mud forming matter, contains an average of eight grains of hardness per gallon.

Due to the steady demand for continuous service from these boilers, which are operated day and night without a letup, it is absolutely essential that they be free from scale, sludge and mud, as an interruption in service to replace or clean boiler tubes would be very costly. costly.



Photograph of Permutit water softening plant described above. Note small size and simplicity of the installation.

With this in mind a Permutit Zeolite water softening system was installed in September, 1920, when the plant was built. It delivers 230,000 gallons of absolutely clean, zero soft water per day, and during the two years it has been in service it has completely prevented the formation of scale, sludge and mud in the boilers or their connections.

A letter from the vice-president of the corporation states in part:

> ". . . recently we opened a boiler after nine months' continuous service and found no scale of any character on the tubes. . . ."
> ". . . we have not as yet replaced a tube after one and one-half years of operation."

In this large boiler plant, operating at heavy loads day and night, there are no cleaning gangs employed, no boiler shut-downs, no tube replacements—and there have been none since the plant was built in 1920.

How about YOUR boiler plant? Let us solve your problems, too. Write for our valuable booklet today.

The Permutit Company
440 Fourth Ave. New York

Zeolite Water Softener Patent Sustained

The Federal Court at Buffalo (Hazel, J.) on June 15th, 1921, handed down a decision sustaining our broad patent covering Zeolite Water Softeners which has been affirmed by the Court of Appeals. According to this decision all Zeolite Water Softening Apparatus on the market not made by us is an infringement of this patent.

No need to borrow trouble — buy Permutit—it is the best anyway.

Send for this free booklet →

The Permutit Company
440 Fourth Ave.
New York

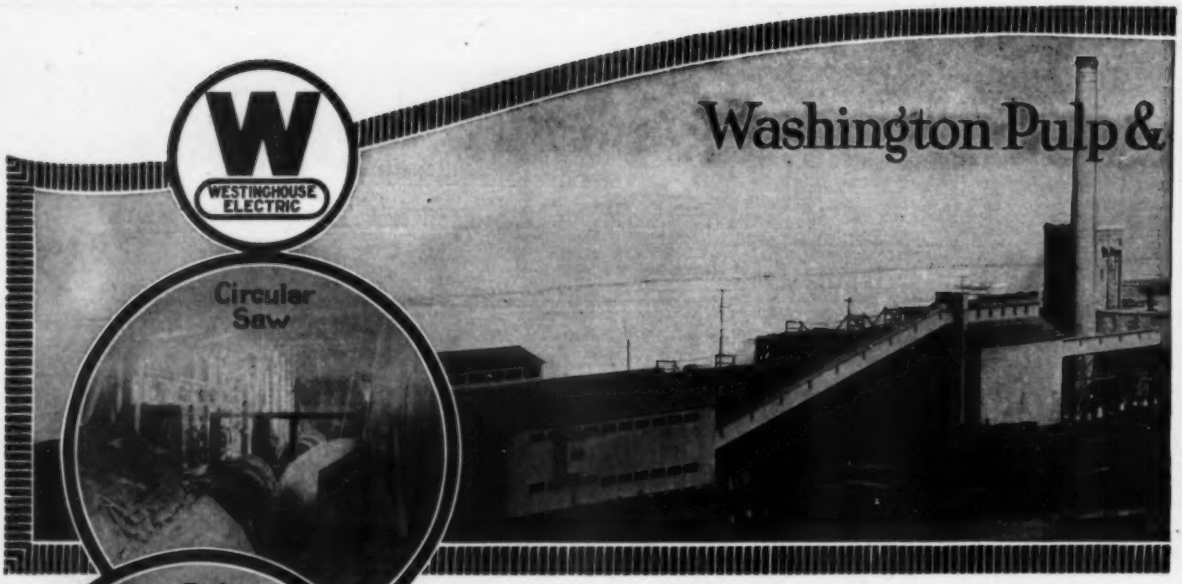
Please send me your free booklet, "Reducing Fuel and Boiler Plant Operating Costs."

Name _____

Address _____

_____

Company _____



What Can Be Accomplished

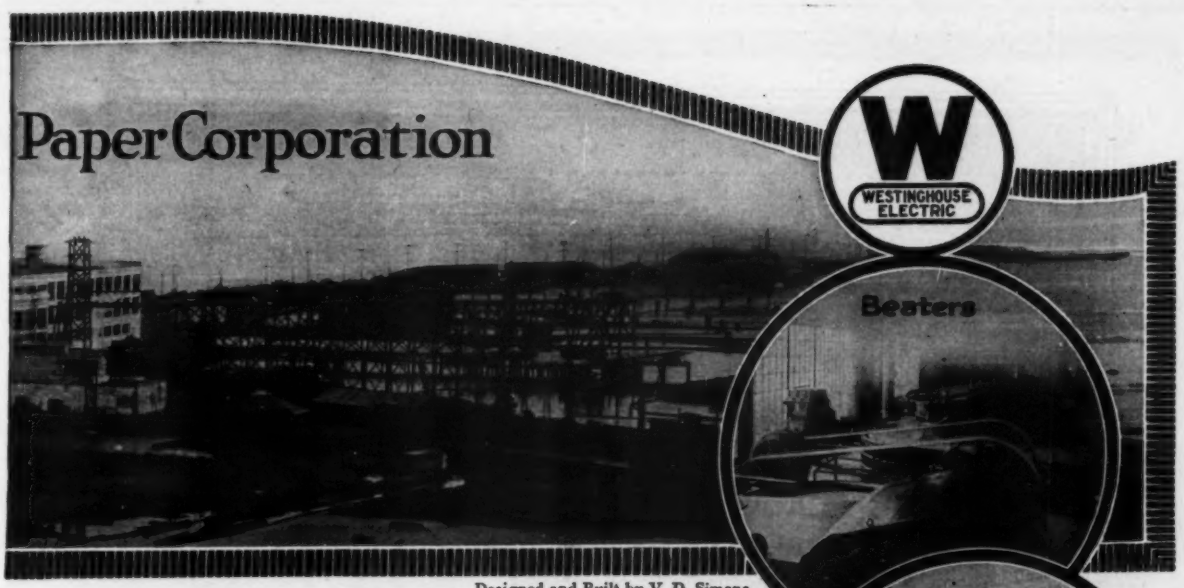
The plant of the Washington Pulp & Paper Corp., Port Angeles, Wash., is one of the best-arranged in the country. It exemplifies what can be accomplished when electrification forms part of the original project.

In the selection and arrangement of machinery, the builders were guided entirely by the requirements and the best functioning of paper-making processes. The principal buildings, such as pulp mill, power house, beater and machine buildings, are re-inforced concrete construction. Electrification imposes no restrictions either in plant construction or the arrangement of machinery.

The Benefits Are Far-Reaching

Electrification should be looked upon as more than an economical means of utilizing power. Use electricity throughout your entire mill and you effect many operating refinements and advantages entirely foreign to the better and more efficient use of power itself.

Westinghouse



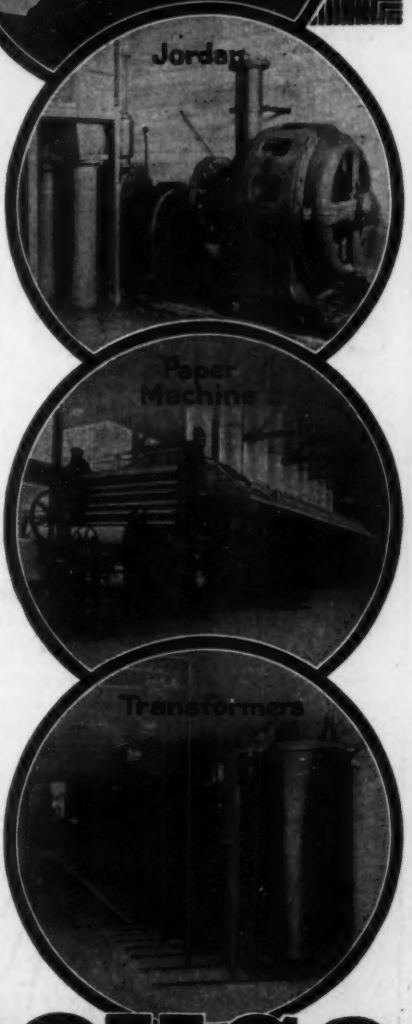
Designed and Built by V. D. Simons, Industrial Engineer, Chicago, Ill.

by Complete Electrification

For example: In the electrified plant, the operator is able to co-operate more satisfactorily with the executive because he can present authentic operating data when it is asked for. By means of switchboard instruments, electric power can be measured accurately —both at the source of generation and points of application. The operator is provided an accurate means of tracing abnormal operation to the offending cause. This opens the way to maximum efficiency in all departments of the mill.

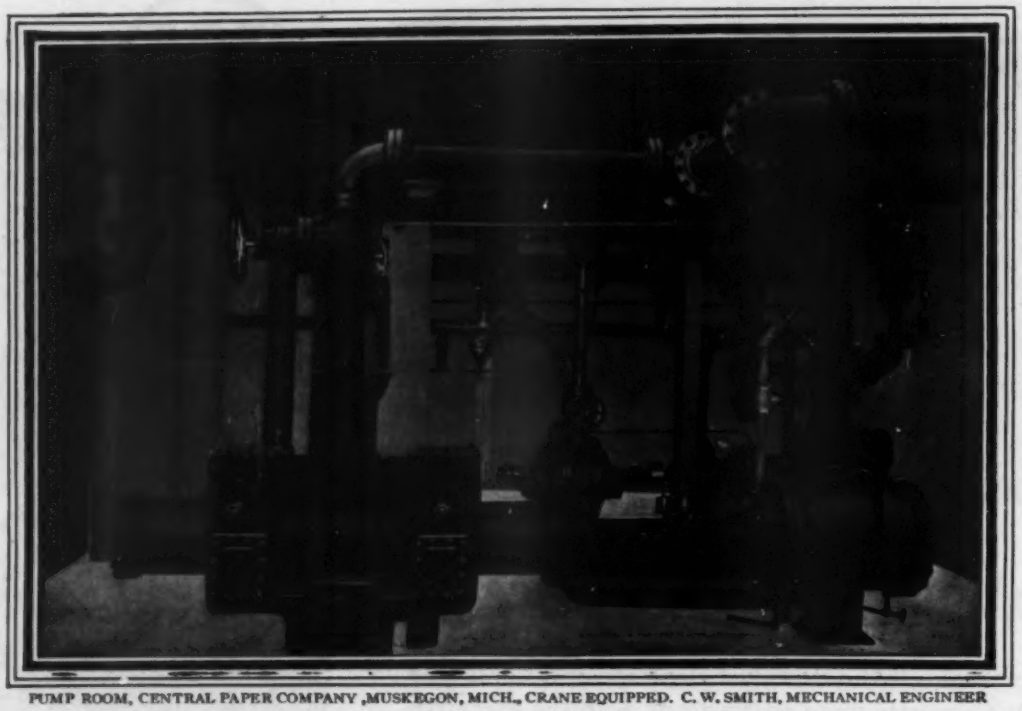
A full appreciation of the many benefits of complete electric operation, has led to the complete electrification of the Port Angeles plant of the Washington Pulp & Paper Corp.

The performance of our initial installation was so satisfactory that when increased capacity was decided upon, Westinghouse apparatus was again selected.



Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Sales Offices in All Principal American Cities.

Westinghouse



PUMP ROOM, CENTRAL PAPER COMPANY ,MUSKEGON, MICH., CRANE EQUIPPED. C. W. SMITH, MECHANICAL ENGINEER

UNIFORM QUALITY IN PIPING SYSTEMS

In paper mills, where an adequate supply of steam and its effective control are vital factors in uninterrupted operation, the equipment must be composed of proved and dependable units. For such requirements, Crane service provides valves, fittings and steam specialties made to withstand the most severe service. Prompt delivery of standardized Crane piping equipment is provided by Crane service which maintains complete stocks at branch houses located at strategic shipping points in every section of the country.

CRANE

GENERAL OFFICES: CRANE BUILDING, 836 S. MICHIGAN AVE., CHICAGO

Branches and Sales Offices in One Hundred and Thirty-five Cities
National Exhibit Rooms: Chicago, New York, Atlantic City
Works: Chicago and Bridgeport

CRANE, LIMITED, MONTREAL. CRANE-BENNETT, LTD., LONDON
CRANE EXPORT CORPORATION: NEW YORK, SAN FRANCISCO
CIE CRANE, PARIS

Crane 75 Low Pressure Globe Valve

MOORE

"Best at every turn"

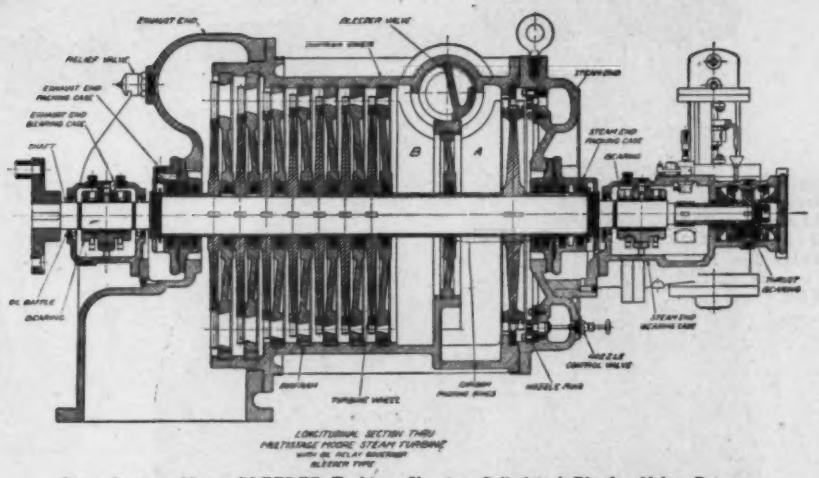
MOORE

Steam Turbines

Non-Corrosive Buckets
Reamed Nozzles
Large Clearances
Low Speeds
Safe Stresses
Dependable Governors
Horizontally Split Casings and Diaframs
High Steam Economy
Low Steam Velocities
Trustworthy Automatic Control

Simple Design—Honest Construction

Offices in all principal cities



Cross Section—Moore BLEEDER Turbine, Showing Cylindrical Bleeder Valve Between High and Low Stages

BLEEDER TURBINES

Low Water Rates Are Inherent

The Moore Cylindrical Bleeder valve between the high and low pressure stages allows the excess steam from the high pressure stage to flow in a straight, unhampered path from the bleeder chamber A to the low pressure stage B. No angles—no "wire drawing"—high efficiency—*lowest water rates*—bound to be!

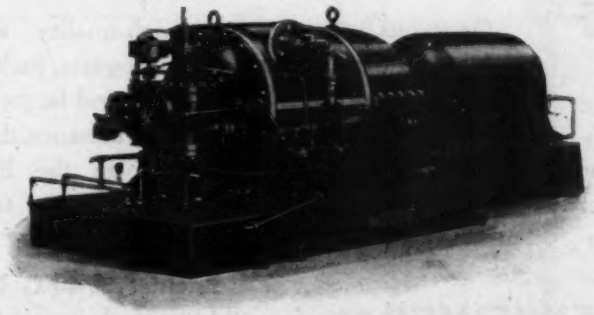
The Moore bleeder valve allows steam to leak from A to B and keep down temperatures due to windage, in the low pressure stages. A small clearance between valve and seat absolutely prevents any tendency to rust tight or stick.

Two big steel shafts at either end of the valve rotate in bronze bushed bearings—simple—positive.

And the whole valve is automatically and positively actuated by the simplest of diaphragm controls—connected to the exhaust system.

By careful analysis there is only ONE economical and reliable bleeder mechanism—MOORE.

Details upon request.



Sizes—100 KW. to 1000 KW. Direct Connected or Geared

Turbines—5 to 1500 Horsepower
Turbo-generators—up to 1000 K. W.
Double Herringbone Reduction Gears
Turbo Pumps and Blowers

MOORE STEAM TURBINE CORPORATION

WELLSVILLE, NEW YORK

Sole Canadian Representatives—Darling Brothers, Limited, Montreal

LUNKENHEIMER
Bronze Gate Valves

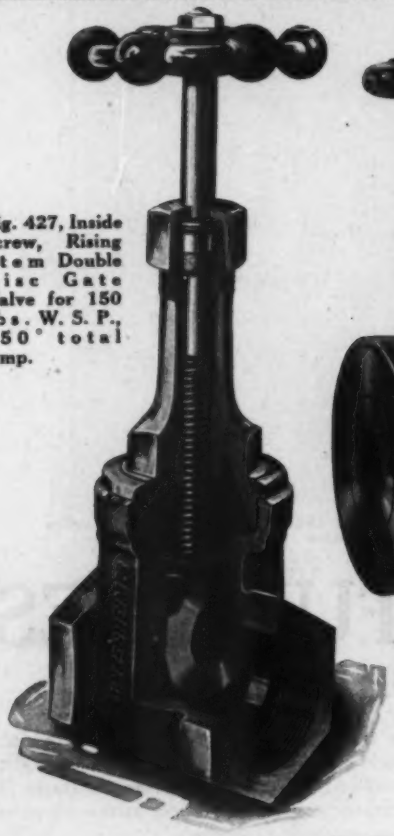


Fig. 427, Inside Screw, Rising Stem Double Disc Gate Valve for 150 lbs. W. S. P., 550° total temp.

Fig. 835, Ex. Hy. Flange End Wedge Disc Gate Valve, with Rising Stem, Outside Screw. For 250 lbs., W.S.P., and 550° total temp.

Fig. 768, Inside Screw, Stationary Stem Wedge Disc Gate Valve. For 200 lbs., W.S.P., 550° total temp.

Long service life is a characteristic of Lunkenheimer Bronze Gate Valves.

The Lunkenheimer "double taper" wedge seat construction, with the disc accurately guided in its travel, eliminates "dragging" of the disc across the seating faces, the common cause of wear in most gate valves. It also provides for positive closing without undue pull on the handwheel.

Generous proportions, high-quality materials and the renewability of all parts, including the seat rings in sizes 1 inch and larger of the Wedge Disc type, all tend to enhance their value and insure permanence in the line. Lunkenheimer Bronze Gate Valves take pressure from either end.

Booklet 574-FG lists all types and sizes. Shall we send you a copy?

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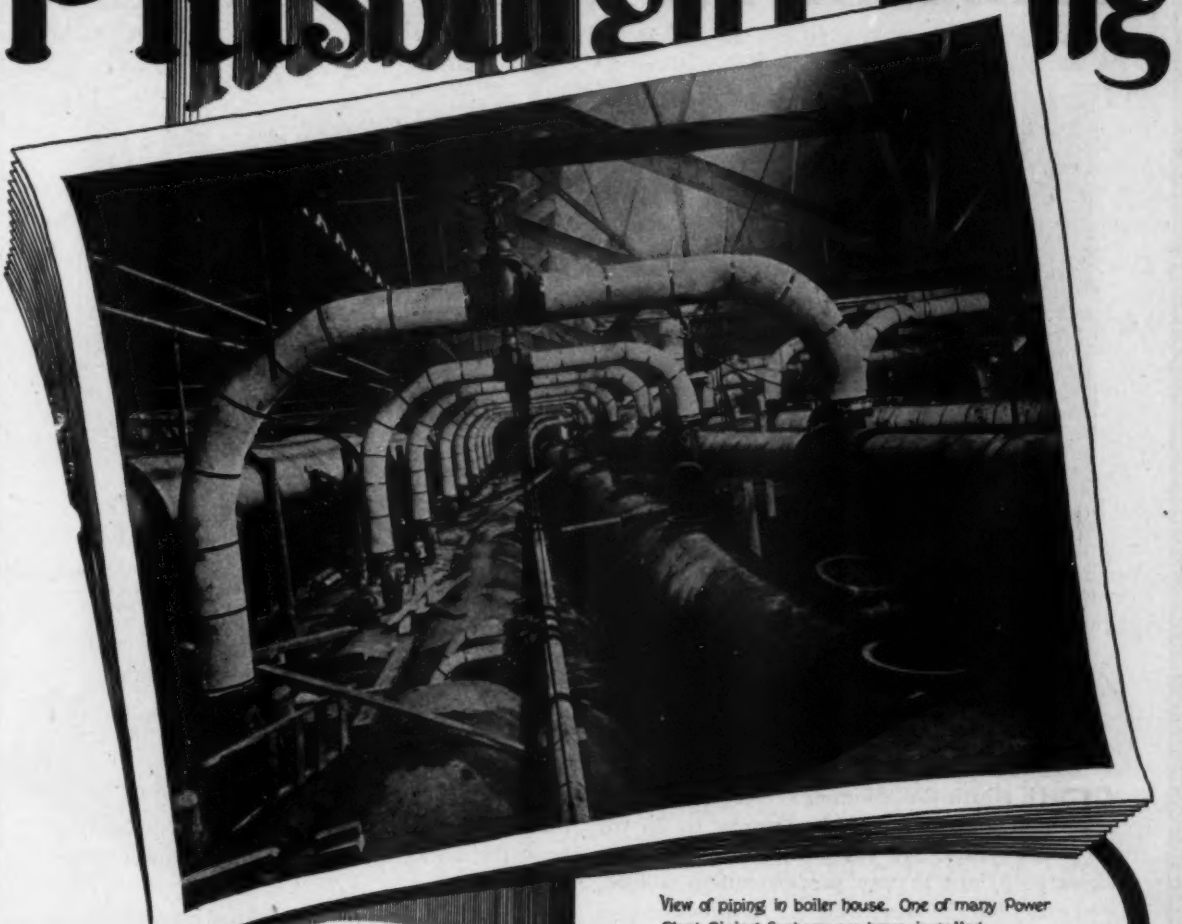

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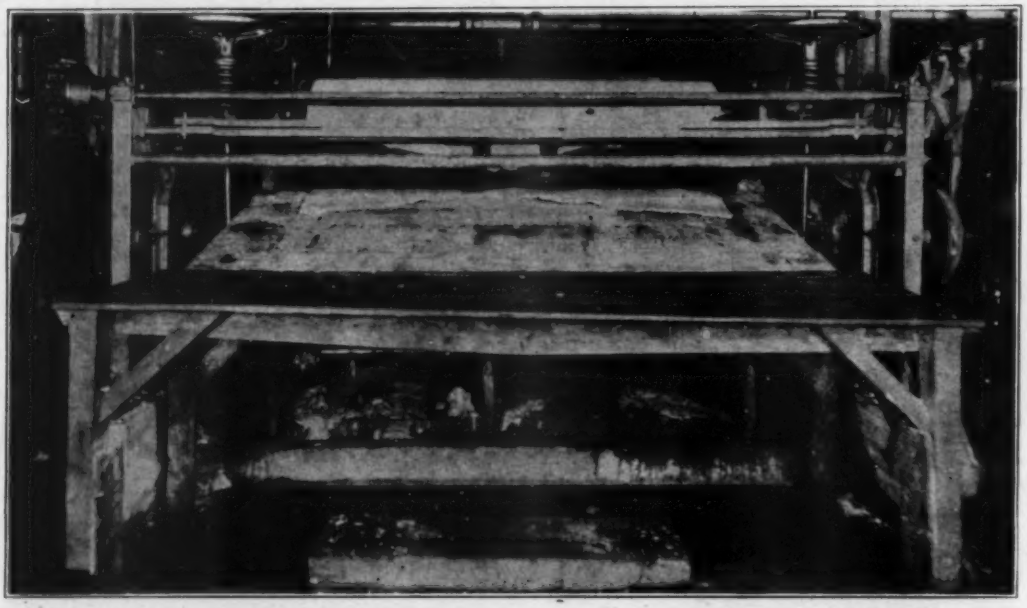
THE NORTH ROLL SKINNER

(Patent Applied For)



This picture shows a lap of hemlock sulphite being skinned off the roll by the North Roll Skinner

THE North Roll Skinner accomplishes what pulp makers have been trying to do for fifty years. It automatically cuts off or skins pulp laps at any **predetermined weight**, and every lap the same weight. Without human help, this skinner cuts any kind of pulp and cuts it every time.

The device consists of two sticks made of hard but not sharp material which rest at the ends of the top roll of any wet machine, and at a set thickness of pulp, move quickly to the center, meet and then move back again. On the way back the sticks lay the flat lap on the table or conveyor.

The North Roll Skinner will fit any wet machine and not mark the roll. It does not bear hard on the roll so as to wear out the felt.

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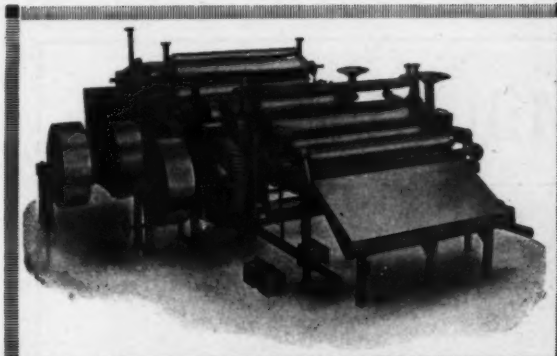

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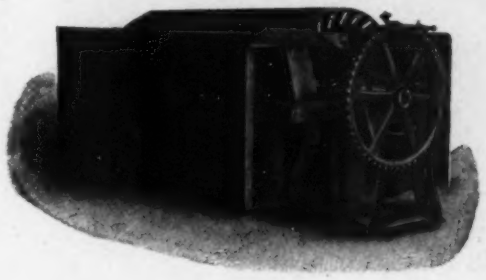

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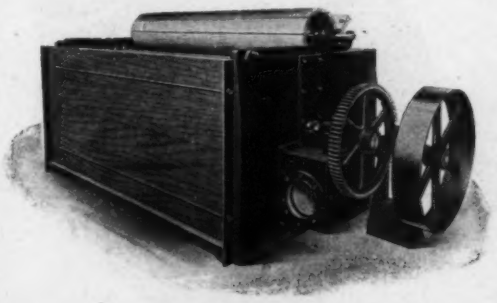

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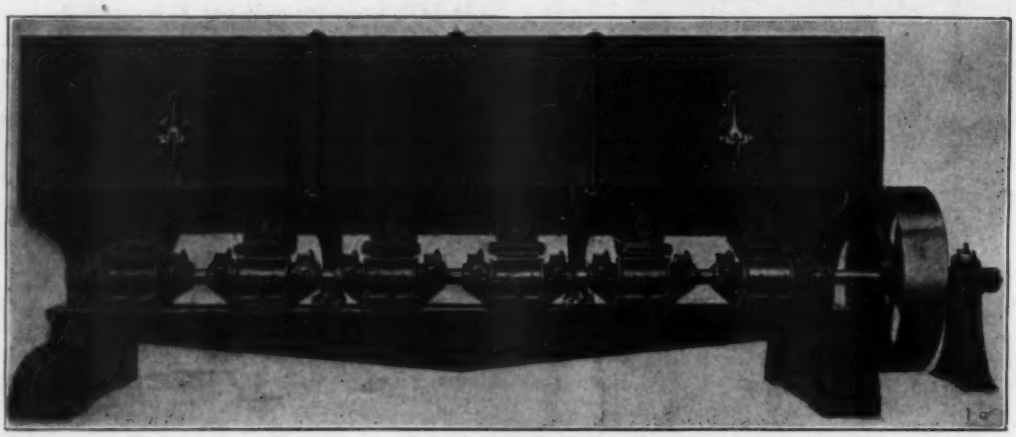

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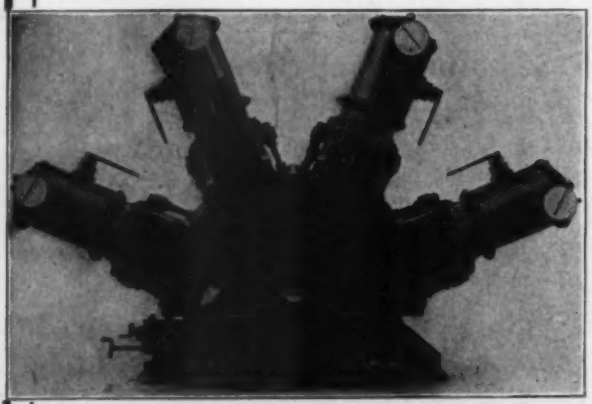

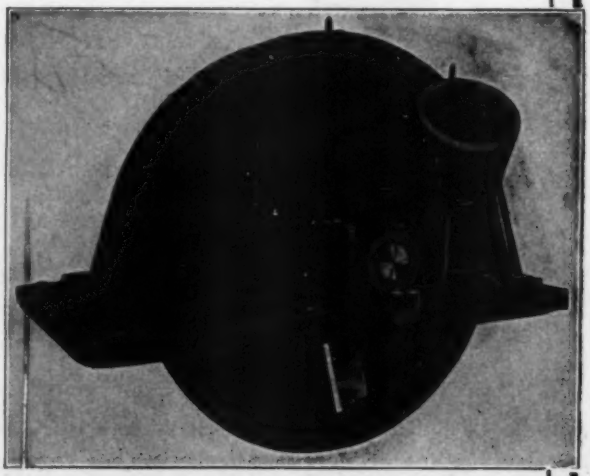

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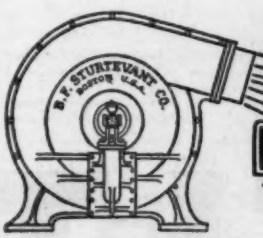

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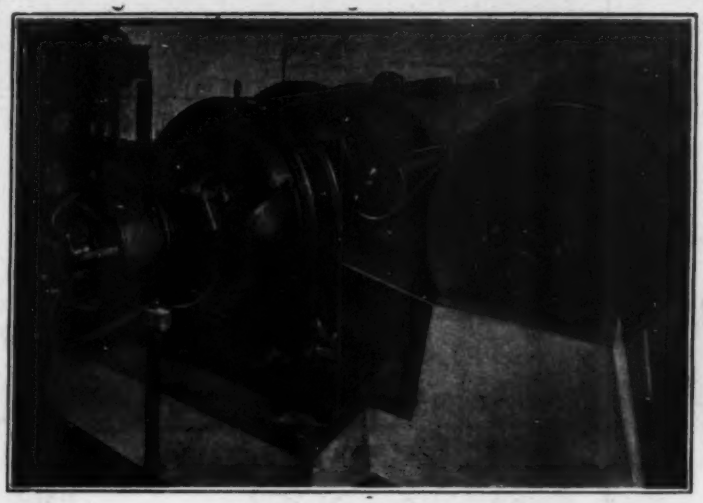

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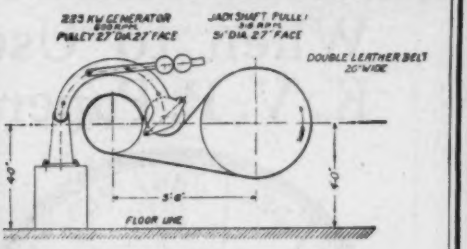

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The trend toward short center belt drives in paper mills is shown in the increasing use of LENIX drives. This can be attributed largely to the growing popularity of the motor drive. However, it is also due to the natural desire on the part of mill men to **reduce costs.**

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The Lenix consists of a roller held against the slack side of the belt by weights, the pressure automatically increasing or decreasing in proportion to the variations in the power transmitted. It has been applied to drives of 1 H.P. and up to 1400 H.P.

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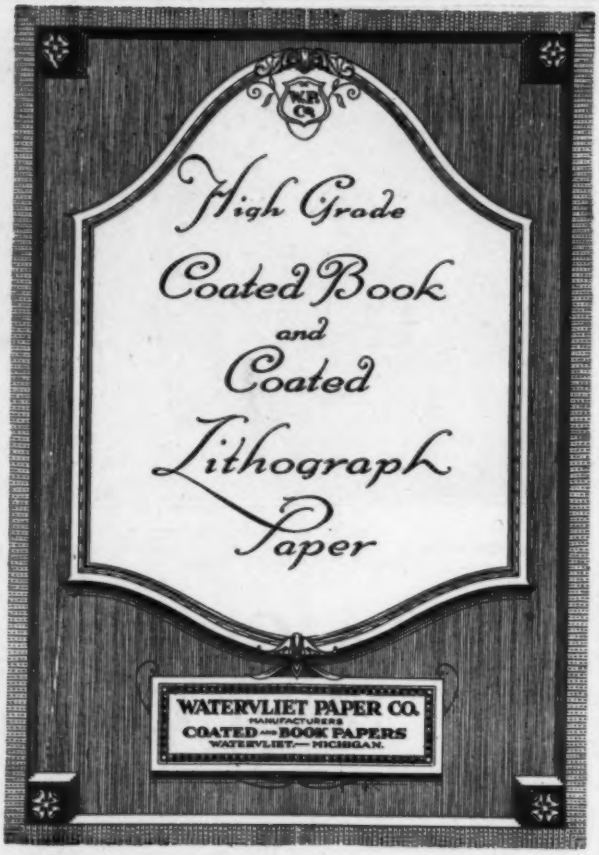

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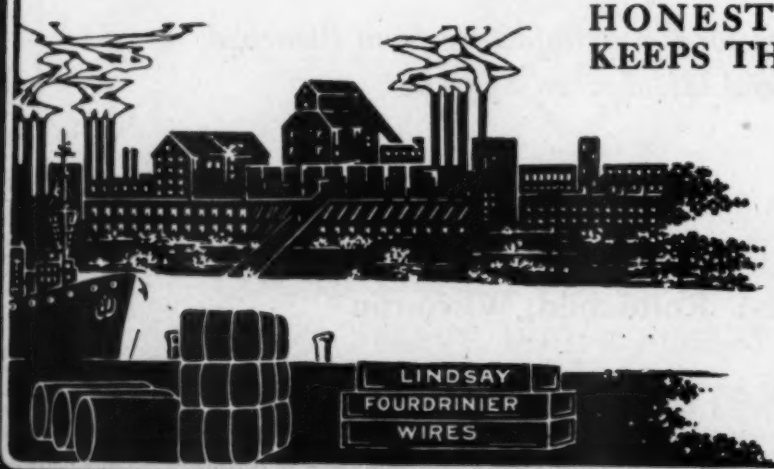

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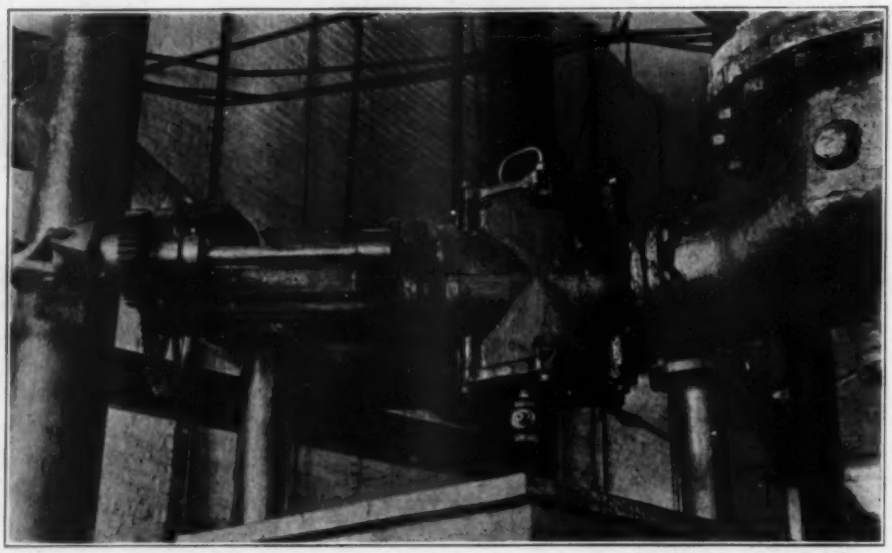
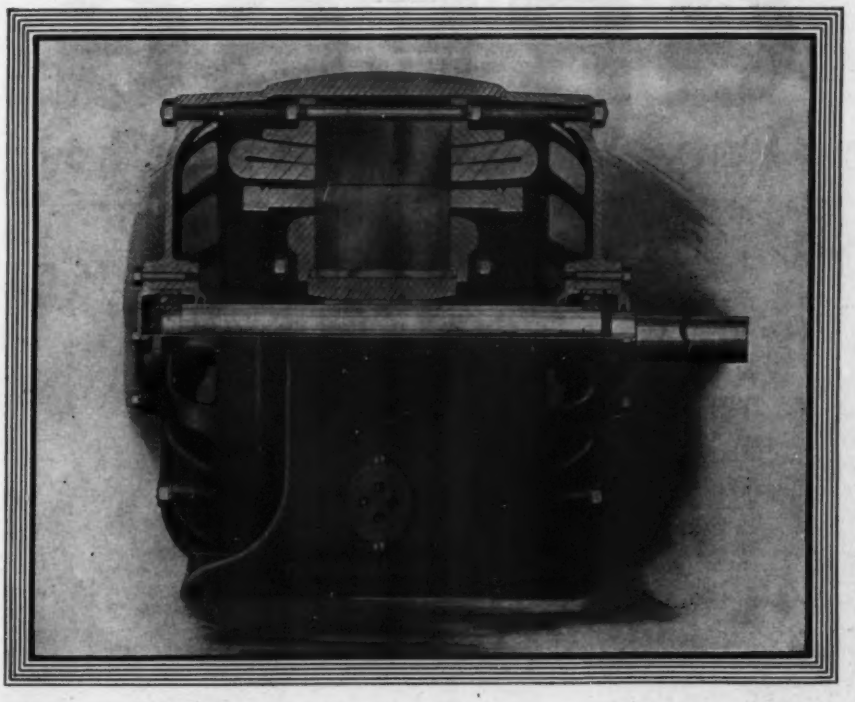


The above is an actual installation of a Horkman Valve in the Wisconsin Rapids Plant of the Consolidated Water Power and Paper Company.

Write for Specifications to

HENRY HORKMAN, Neenah, Wisconsin



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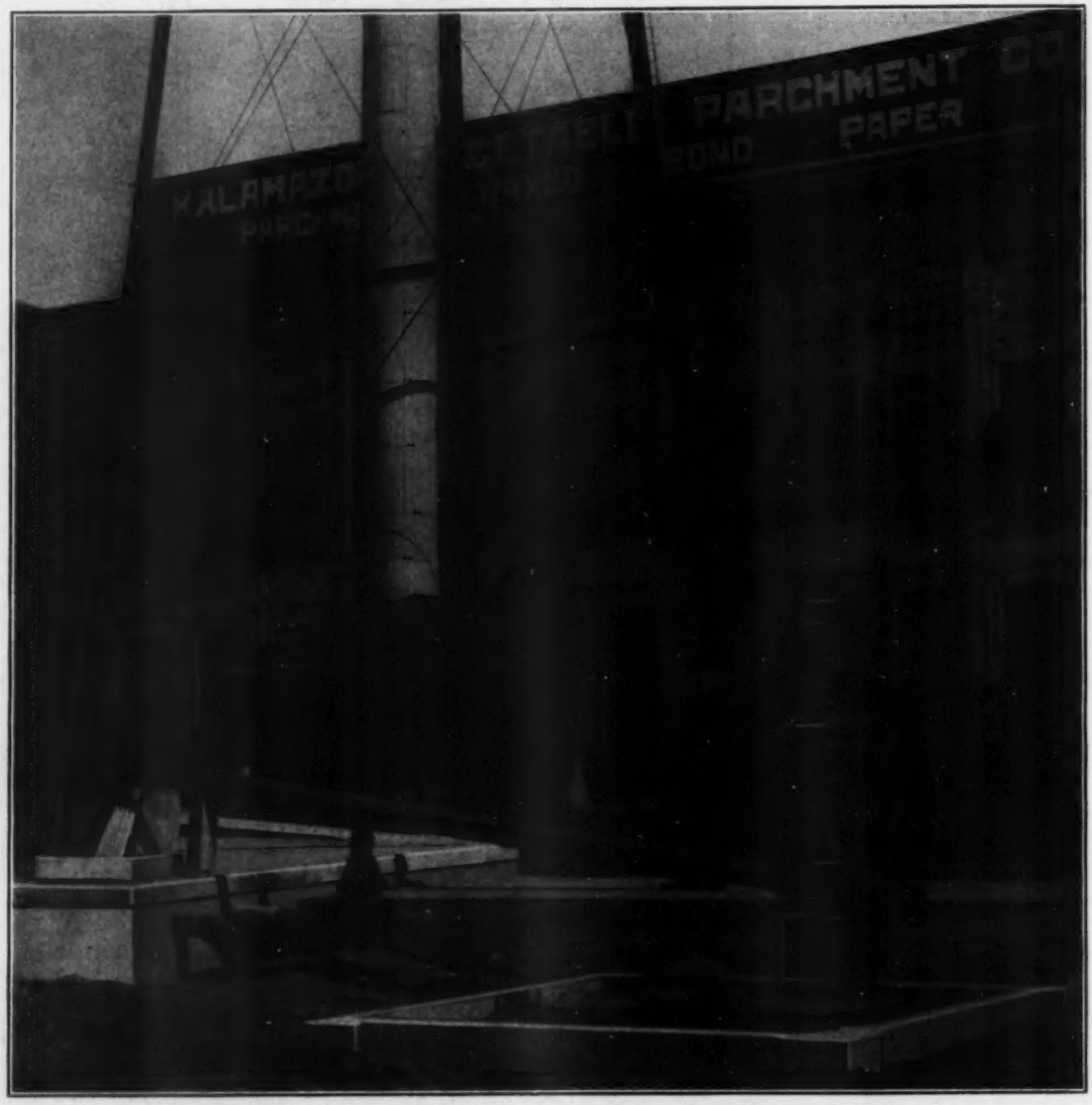

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Let our engineering department cooperate with you in bettering the mechanical efficiency of your plant.

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1718 Republic Building
CHICAGO

The Fourdrinier Machine

By HARRY E. WESTON
Instructor in Pulp and Paper Manufacture, The New York State College of Forestry, Syracuse, N. Y.

REAL credit is due to the work of N. Louis Robert of France, who invented the Paper Machine. In 1798 he announced that he had discovered a way to make sheets of paper of a very large size, even 12 feet wide and 50 feet long, by means of machines. Robert sold his patent to M. Leger Didot, the owner of a French paper-mill, who accompanied by John Gamble, an Englishman, sailed for England. Didot, seeking capitalization of the patent in England, got in touch with Henry and Sealey Fourdrinier, prosperous London stationers. They, with the help of Bryan Donkin, an engineer, were responsible for the success of the paper machine which is now so commonly known as the "Fourdrinier." The invention of the Fourdrinier machine was without doubt the greatest single event in the history of paper manufacture, for without it there would have been no opportunity for the development of machinery and technique as we have them in present day paper manufacture. Since that time the development of the present types of paper machines have evolved.

Paper machines are not built as standard pieces of equipment and are not carried in stock like practically every other piece of equipment used in the industry, but are designed and built according to specifications drawn up by the buyer and manufacturer. They are constructed according to the grade of the paper to be manufactured. Thus we have the newsprint machine, the board machine, the book machine, etc. Even with this special construction for the various grades of paper the same essential parts are found in every make of machine.

The Fourdrinier, according to A. D. Little, is an aggregation of several sections, each composed of many parts, and each section performs a function which is in a sense independent, although for the production of a sheet of finished paper all the func-

Courtesy—The Pusey & Jones Co.

View of Paper Machine from Wet End

tions of the various sections are interdependent and must be co-ordinated.

The first section of the machine has for its function the actual formation of the web which is later to be transformed into the finished paper. It does this by distributing the wet stock as uniformly as possible upon an endless wire-cloth sieve. As this wet stock travels forward, a sidewise motion or "shake" is imparted to the wire to insure the felting and interlocking of the fibers as they are deposited upon it by the drainage through the wire of the water in which they were suspended. This portion of the machine is further supplied with mechanical devices known as suction boxes over which the wire passes and whose function it is to compact the sheet by atmospheric pressure which forces into the box considerable additional water not removed by drainage.

The next great division or section of the Fourdrinier machine has for its purpose the compacting of the wet sheet by mechanical pressure under rollers. The compacted sheet then passes continuously to the third section of the machine, the function of which is to dry the sheet. This drying is effected by carrying the sheet over the surface of heated metal cylinders or dryers.

The remaining sections of the Fourdrinier machine have for their object the "finishing" of the sheet by improving or smoothing its surface by means of heavy and highly polished steel rollers between which the sheet is passed.

Generally speaking, the Fourdrinier is divided into two main divisions—the wet end and the dry end. The pulp fibers from the beater or Jordan are felted into a sheet on the wet end and the sheet is dried and finished on the dry end of the machine.

The following list may serve as a guide when studying the Fourdrinier machine:

1—Head Box; 2—Apron; 3—Slices; 4—Fourdrinier Wire; 5—Table Rolls; 6—Deckle Straps; 7—Suction Boxes; 8—Dandy Roll; 9—Shaking Arrangement; 10—Couch Rolls, including Suction Rolls; 11—Press Rolls, including Suction Rolls; 12—Smoothing Press; 13—Wet Felts; 14—Dryers; 15—Dryer Felts; 16—Calenders; 17—Reels; 18—Winder; 19—Drive Arrangement; 20—Operation; 21—Output.

Head Box

The head box is usually constructed of 3 or 4 inch hardpine or cypress planks, strengthened with iron rods, and so designed as to deliver the entire flow of water and pulp mixture from the screens upon the apron and wire. The stock cannot be rushed onto the wire with undue pressure as this would create currents and boiling action, but it should be delivered onto the apron in a smooth flow for the full width of the machine. Such stock should be thoroughly mixed and the fibers drawn out and separated. This insures an even consistency of stock. The box should be built tight. Sometimes it is so constructed that the stock is streaky because of uneven consistency as it flows onto the wire. Such a box is not of the right construction and should not be used.

The box is usually made up of two or more compartments. The size of the box is determined entirely by the volume of stock and water that has to be handled. The stock is usually delivered at the back of the box directly from the screen spout. It is often put into the box at the top, allowed to fill the compartment, striking against the partition and coming up and over the edge of the last partition and upon the apron. In case it is necessary to enter the stock low in the head box, the first partition next to the intake goes clear to the bottom. The stock must then flow over the top of the first partition and underneath the next one. An overflow is also provided at the back side of the flow box to take care of any gush of water caused by the screens filling up or by an uneven flow of the pumps, etc. The head box is likewise usually equipped with a lip at the outlet where the stock is distributed onto the apron. This lip can be raised by means of hinges attached to the underside. It carries the apron across the breast roll, and is therefore known as the apron board. This board swings back out of the way when it is necessary to take out the breast roll for putting on a new wire.

Apron and Slices

The apron, usually made of rubber or fabrikoid, is a shallow flexible trough through which the stuff flows onto the wire. It bridges the open space between the breast roll and the head box.

The slices are sheets of brass, ordinarily 6 to 12 inches wide, and about ½ inch thick. They are placed across the wire vertical to its surface and act as a dam in holding back the stock, thus forming a pond by keeping the apron full of the water containing the pulp fibres. The slices are made in two sections which are so arranged that their width may be made to conform with the width of the sheet being made. This is done by allowing one slice to slip by the other and holding both of them firm by thumbscrews after the length of slice is determined. There are also arrangements to lower or raise the slices to regulate the even distribution of stuff on the wire. The slices are raised one inch or less from the wire which allows the water and fibres to flow onto it.

The force with which the stock comes out of the pond and under the slices is in direct proportion to the height of the stock in the pond. This head or pressure is regulated by the supply of stock and also by the height of the slices from the wire. Lowering the slices reduces the area of outlet, thus backing up the stock in the pond to a greater height. When the slices are raised this condition is reversed. Raising the stock in the pond by the use of the slices has the effect of giving the stuff more speed as it is delivered to the wire.

Changes in the slices or stock supply are governed

by the kind of paper being made. It is necessary to deliver the stuff to the wire at as near the speed of the wire as possible. Slices are carried high on free stuff in order to supply the necessary amount of water needed to properly close the sheet on the wire before it reaches the suction boxes. On the other hand, slices are carried low or close to the wire on slow stuff so as to reduce the quantity of water. In most cases, when making heavy paper, the slices are carried close to the wire except for free stock when they must be raised. When set very low the slices catch the fibres and turn them on end. This action causes the sheet to have a broken unfelted appearance which is more noticeable when working long stuff. It is the cause of a wavy streaked appearance in thick sheets. Sometimes two slices are used. The first slice should be twice the distance from the wire of the second one. This arrangement causes a current to be set up between the two and insures a thorough mixing of the fibers. The width of deckle also influences the position of the slices; the slices on a narrow deckle being carried higher than on a wide deckle.

The position of the apron in regard to that of the slice is dependent upon the paper being made. The lower edge of the apron is often within 1 inch of the first slice when starting the run. This position may be varied later, depending on the kind of stock and quality of paper. The apron is sometimes moved forward to the first slice when making a thin sheet from free stock or it may be pulled back in some cases as much as two inches when making a thick sheet from slow stock.

Fourdrinier Wires

The wire used on the paper machine must be carefully made with the best materials obtainable. High grade phosphor bronze and high grade brass wire are commonly used in their manufacture. The wire is woven on looms with a web usually from 55 to 70 mesh (55 to 70 wires to the inch), although the range of mesh may vary from 14 to 100. The finer mesh would be used for special papers, such as cigarette paper and the like. Several other grades of wire are used in the manufacture of paper, but these are generally used for covering cylinders and not for Fourdrinier wires. Because of the short time that phosphor bronze wires have been satisfactorily made, brass wires seem to be more extensively used than phosphor bronze. However, it should be said that the demand for phosphor bronze wires will probably increase.

The wire is joined at the ends to make it endless by either a stitched wire seam or by a soldered seam. The stitched seam is made by sewing up each end of the cloth with phosphor bronze wire and then lacing the ends together with the same material. A soldered seam is made by soldering the end shute wire of each end of the cloth to the warp wires and then bringing the two ends together with very fine phosphor bronze wire. The wires running lengthwise through the wire or cloth are the warp wires, while the wires that run across the cloth or Fourdrinier wire are known as shute or filler wires. The soldering operation is very difficult to perform, as the tiny holes of the mesh must not be filled up with solder. The seam is brought down level with the surface of the wire by rolling, hammering, or both. This seam must be smooth on top as well as on the under side, and must be as near the mesh of the wire as it is possible to make it.

As mentioned previously, the sheet is formed by distributing the wet stock upon the wire to which, as it travels forward, a sidewise motion is imparted to insure the felting and interlocking of the fibers. The length of wire is generally determined by the speed at which the machine is to be driven, and the nature of the stock that is to be used. A long wire is used on machines handling short, soft, greasy stuff. It is slow stock, and the long wire thus allows more time for the water to be removed. Fine, long stock, not too soft, when run over machines of moderate speed, is usually formed on short wires. The speed will also, determine the amount of pitch or inclination to be given to the wire.

Wires on high speed machines (newsprint machines operating constantly at 600 feet or more per minute) are often raised at the breast roll as much as 16 to 18 or more inches. If the stuff were moving slower than the wire, the sheet would be rough and not properly felted; and if the stuff were running faster than the wire, it would make a streaky sheet, as the stuff would accumulate in puddles. Generally, the actual formation of a sheet of paper does not begin for a distance down to and including some space beyond the slices. It is at this point on the wire that the stock is of sufficient concentration for felting. "Snap-offs" or crackings and breakings in the sheet between the dryers and the calenders are often caused by too slack a wire. When the wire runs too slack, the seam is apt to crease the paper when passing under the couch roll. This slackness is often difficult to notice and is most liable to happen when making a narrow sheet of heavy paper. The wire should be tightened up slightly and additional weight should be put on the couch roll to overcome this difficulty.

A number of factors enter in the determination of the life of a wire. A few of the well known ones that cause deterioration of the wire may be listed as:

1. Improper installation of new wire.
2. Top couch roll located back too far.
3. Stretch of wire uneven on sides or too tightly stretched.
4. Poor quality of water used on machine.
5. Pitch impressed into the wire.
6. Foreign substances passing through the wire—sand and foreign matter in shower water, etc.
7. Cleaning of wire with acids and brushes.
8. Breaking of jackets.

9. Accumulation of stock on the wire and breast rolls because of imperfect deckle straps and carelessness.
10. Unbalanced rolls and improper bearings on the rolls.
11. Rolls out of alignment.
12. Imperfect wire guide and guide rolls.
13. Improper suction, causing floods on wire.
14. Deep pond over the apron and heavy load on the wire.
15. Inefficient management—lack of inspection, co-operation, etc.

It is necessary that everything be in order when changing a wire, as much depends on the care with which the wire is put on. All parts of the machine should be thoroughly cleaned and freed from dirt and slime. The rolls should all be well scraped, since foreign material or stuff on them will cause ridges. The suction boxes must be smooth and properly dressed. All bearings should also be well oiled.

The machine is now ready for the new wire. As the latter is fine and delicate, great care must be used in handling it. A bruise or kink in the wire will cause it to wear or break thru in a comparatively short time. Defects in manufacture or damage caused in transit should be observed, if possible, before the wire is put on the machine. A wire should never be too tight when started, as it is usually stretched before leaving the factory. It should never be stretched while not in motion, as stretching would take place locally rather than evenly over the whole surface. Before starting the wire an inspection of the Fourdrinier part is advisable, so that nothing that should be done is left undone. All of its parts should be level and in line. It is imperative that the breast roll be in its proper position. If it is out of line only a fraction of an inch, the wire is apt to run into a wrinkle, and thus cause trouble. As soon as everything is in readiness, it is a good plan to turn the wire around slowly once or twice before setting down the couch, so as to get the wire in proper alignment. The clutch should be operated gently and should never grip so hard as to start the wire with a jerk. The stretch roll is fastened down after the couch roll is lowered into position.

A guide roll, controlled by an automatic device called the wire guide, is used to keep the wire in proper alignment. It is located between the couch rolls and the last suction box, and is on a level with the suction box.

Good showers should be provided for the wash roll directly under the couches. The shower should strike the top side so as to beat off the stock as it follows down around the roll. Showers should also be provided for the stretch roll, where all particles of fiber should be rinsed away from the wire and roll. A doctor is provided for the wash or carrying roll. It is essential that the wire be carefully handled from the time it is taken from the shipping box until it is through making paper.

Table Rolls or Tube Rolls

The table rolls are a number of parallel brass tube rolls designed to support the wire by forming a table upon which the wire runs. These rolls aid in draining the water from the stock when it is on the wire. The wire has enough capillary attraction so that it will hold up nearly all of the liquid on the top of the cloth. The large number of small table rolls aids in overcoming this attraction and allows the water to drain through the wire. The rolls are rotated by the movement of the cloth. On the forward side of each roll a continuous stream of water is coming away, whereas between the rolls no water, or only a very small amount, leaves the underside of the wire. If one of the table rolls is prevented from rotating, the stream of water leaving it immediately ceases.

The importance of the table rolls cannot be overestimated. If a roll gets out of order it should be replaced at once, or it should be lowered out of touch with the wire until it can be replaced with a new one. The wire running over a stationary roll will wear a flat place on the roll in a short time. Rolls with sprung journals, causing the rolls to be off center, must be observed and replaced, since they would produce an elevation in the wire, puddling the stock and causing thick streaks in the paper.

The rolls at the breast roll end and under the pond and slices are often larger than those forming the balance of the table. This excess size prevents springing of the rolls under the excess of weight of the pond.

Deckle Straps

Deckle straps on a Fourdrinier machine are simply a means of forming confining dams against which the paper stuff forms, thus determining the width of sheet being made. The deckle straps lie flat and square on the wire and prevent the fibers from spreading. They are set at a width corresponding to the width of the pond, slices and apron. The two straps being used, one on either side of the wire, are run over individual flanged pulleys like an endless horizontal belt. The upper strand is supported by the flanged pulleys, while the lower strand is supported by the wire which carries the strap along with it by friction, causing it to revolve upon the flanged pulleys. The flanged pulleys are so made that they may be moved in or out. When they are moved, the deckle straps move with them. Modern high-speed machines have six or more suction boxes. The length of the straps is so determined that three of the boxes are generally placed under the straps, and the remainder of the boxes between the straps and the couch. This arrangement gives the sheet sufficient firmness to stand up after leaving the straps and molds a square, safe running edge.

There are several grades of deckle straps in common use. Two of them made by a well-known manufacturer are designated as:

1. The Four Ace Strap.
2. The Giant Strap.

The Four Ace Strap is made of a very high grade rubber, while the Giant Strap is of a slightly lower grade. Machines equipped with small deckle pulleys, and using only a very small amount of kerosene to keep down the foam, should use the Four Ace Strap. This recommendation is due to the high grade of rubber used in its construction and because of its adaptability to stretch and take care of any distortion caused by the small size of the deckle pulleys. This strap is quite porous and will absorb kerosene oil. If kerosene is used in large quantities the strap swells, gets out of shape, and tends to become tacky. Such a strap also gives good results on deckle pulleys of 18 inches or over in diameter. The Giant Strap is used for large size deckle pulleys—18 inches or over. It will resist the action of kerosene, as the stock is more dense.

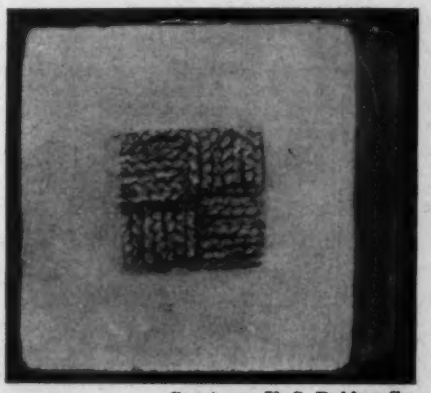
The construction of these two grades of deckle strap is very interesting because of their fabric center. This construction, covered by a patent, allows the running of any of the four sides next to the paper machine wire.

Very often the edges of a strap become worn. This condition allows the stock to get under the strap and causes trouble. Straps may be ground straight across the surface or with the four surfaces concave. The straight face is in most common use. The concave surface gives a very sharp edge and, even though the edge is worn down somewhat, it practically retains its position. Some straps on the market are constructed with a fabric or duck laid straight across the core.

Straps are made in various sizes, but the popular size is 2 inches square. Straps 2¼"x2¼", 1¾"x2", 2"x2½", etc., are sometimes used.

Straps are generally shipped from the factory coiled in a large flat shipping box. Immediately upon receipt at the plant they should be removed from the box. Various ideas are given as to the best method of storing them. Some mills have built special tanks or vats in which the straps may be kept immersed in water when not in use. At any rate they should be laid out straight and kept in a cool, dark place until needed. If they are kept in the original shipping case they will set at points where there are sharp turns and when put on a machine will run crooked. Considerable space is required for storing the straps when vats are used, and some authorities do not believe this procedure is absolutely necessary. The same result can be accomplished by making a number of wooden discs of about the same diameter as the deckle pulleys, and of the same width of the strap. The discs can be placed on the wall in the basement of the mill at a point where it is damp and dark, and the straps may then be hung upon them. If it is necessary to keep a deckle strap away from moisture for any considerable time, its position should be changed each day. Otherwise it would harden and become rigid in whatever shape it was kept. No oil or grease should be allowed to come in contact with a strap, as the strap would be very easily ruined by them.

All deckle straps with cracked edges, crooked places, poor splices, worn edges, uneven spots, etc., should be avoided. Cracked edges cause lumps and projections to form in the edge of the web of paper. A sheet in this condition is very apt to break either on the couchers or presses. Crooked places in a strap are often caused by poor storage. The spare strap was probably hung in a dry place and allowed to remain in one position so long that the rubber dried out and became set. This condition does not permit



Courtesy—U. S. Rubber Co.
Illustration Showing Special Fabric Center of Deckle Strap

the strap to fit the wire closely and in some cases allows the paper stuff to run under it, making a bad edge on the sheet. Poor splices sometimes occur so that the strap pulls apart for a little distance at the beginning of the splice. Care exercised in putting on the strap will often avoid this condition. Endless deckle straps of any length and size required are being manufactured. This type of strap does away with the splice and therefore does away with the defect in the sheet caused by a poor splice. A poor edge on the web of paper is often caused by a worn edge on the strap. Uneven spots and projections on a deckle strap will also cause imperfections in the sheet of paper being formed. Care should be used with the straps when putting on wires. If the straps are taken up with the deckle frame they should be tied up in places where they sag with pieces of woolen felt about 3 or 4 inches wide. This felt is soft and pliable and will never dent the edge of the strap as will a small, hard string. Hanging straps over sharp projections also causes nicks or indentures which may not come out for some time after it has been put to use. All of these imperfections will often cause the paper to break at the couchers, presses, dryers, or calenders.

It is, therefore, necessary from time to time to have the straps reground and other small repairs made where the edges have cracked or have been cut.

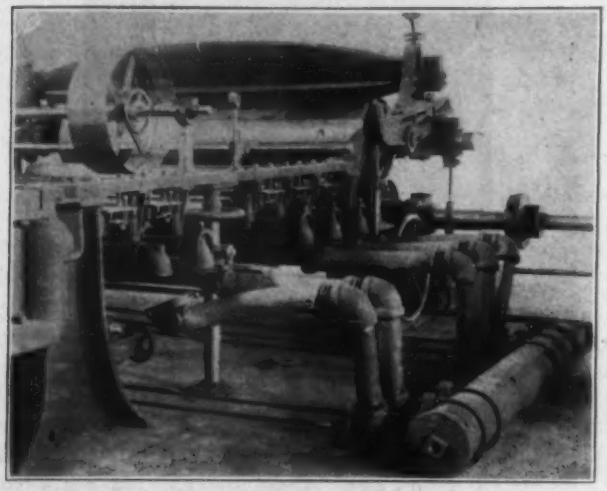
The life of a deckle strap depends upon the speed of the machine and the length of the wire, together

with the various factors mentioned in regard to the care it should receive. Cases are known where straps have been in use for eight to ten years, but the average life is about six years.

Suction Boxes

From what has been said, it will be seen that the extraction of the loose water from the wire and from the fibers cannot be completed within a reasonable time by means of the table rolls. Therefore, suction boxes are installed to facilitate the removal of this water.

These suction boxes are long, narrow, brass boxes fitted with wooden covers. The covers are perforated



Courtesy—Sandy Hill Iron & Brass Works.
Illustration Showing the Connection Between Syphon Hose and Suction Boxes (Open Connection in the Foreground)

with round ½-inch holes or other openings, which are so arranged as to come in direct contact with every particle of paper that passes over the wire. The opening of the covers usually flare a little on the under side so that accumulations of slime, etc., will tend to drop out.

A set of pipes leading from a vacuum pump are connected to the underside of each suction box. They are regulated by valves, so that the vacuum can be regulated on each individual box. Expanding plungers are inserted in the ends of each box so that the vacuum area may be increased or decreased, depending upon the width of sheet desired. The suction boxes will often remove nearly 15 percent of the water in the newly formed sheet.

Oftentimes in making light sheets the first suction box may be closed. It should be lowered away from the wire so that no break in the sheet will be caused by the box filling up with water and slopping up through the sheet.

The degree of vacuum employed varies with the mill. Three to three and one-half pounds is common. Higher vacuum could be easily obtained and would probably give good results in so far as the sheet is concerned. The vacuum area on a machine, however, is sufficiently large to create a load equivalent to one or two tons pressing down on the surface of the wire. As the wire has to be driven against this friction, it is best not to have the vacuum too large. It may be impossible to drive the wire if the vacuum is too great.

The suction box covers must always be properly dressed and smooth. The cover should be dressed after it is screwed on the box. The box should be removed during the operation and kept supported, due to the liability of the box appearing true until placed on the machine and then be found to sag slightly. Much care should be taken by the millwright in doing this work.

The Dandy Roll

The early Fourdrinier was improved in 1830 by John Wilks, an English machinist. He added a perforated roller to aid the escape of water from the forming sheet before being subjected to the press rolls. This roll was designated as a "dandy," probably because of its effect upon the appearance of the finished sheet.

The dandy roll, as used in present-day manufacture, has two important functions to perform; namely, to smooth down the surface of the sheet during formation and to watermark the sheet.

It is necessary that the dandy roll be very light in construction, and rigid enough so as not to spring. The roll should be open enough in construction to prevent its filling up. The usual type of dandy roll is a fabricated roll made up of comparatively heavy wire, with a facing of lighter wire on the outside, and closed at both ends by discs to which the journals are attached. There are two kinds of covers for plain dandy rolls. One cover, designated as wove, is made up of wire cloth of the desired mesh. The other type is designated as a "laid cover." In this case the cover is woven with a chain about one inch apart along the face of the roll. Long wires are then woven into these chains for the entire length of the dandy often enough to secure the fineness of mesh desired. The mesh varies from eight to the inch to as much as twenty-two. Very seldom is anything finer than twenty-two mesh desired. Paper produced with such a roll is designated as "laid paper," due to the appearance of a series of parallel lines in the sheet.

Standards are drawn up by individual manufacturers for the construction of their dandy rolls. It is necessary to accommodate their construction to different existing conditions. They are made in all sorts of diameters from five and one-half up to twenty-four inches, and in lengths to fit all of the machines in existence, ranging from fifty to nearly two hundred and fifty inches in width. A dandy roll is usually from 7 to 10 inches in diameter, and from 80 to 200 inches long. On very wide and fast running news machines the dandies are larger in diameter, running

anywhere from 12 up to 24 inches in diameter. One of the longest dandy rolls up to the present time, according to E. C. Spear, was made for a 232-inch Fourdrinier wire. The roll is 2 inches wider than the wire and is only 16 inches in diameter.

Watermarking, invented between the thirteenth and fourteenth centuries in Italy, has for its purpose the identification of a paper of any given manufacturer, and commonly consists of a name or a trademark. It is also employed to put any desired pattern on the paper being produced.

Watermarked dandies are of the same general construction as the plain dandies, except for having a design of wire securely soldered to its outer surface. The spacing of the design upon the dandy is determined by its marking the surface of the sheet of paper as often as it is needed. The diameter of these watermark dandies varies with the sizes of the sheet and the number of marks that are to appear in a sheet. They commonly run from 6 inches in diameter up to 10 inches and even 11 inches in diameter.

Paper occasionally has fancy designs. These designs are made by a dandy roll, which in many cases is completely covered over its entire surface with the wire design soldered into position. Watermarks are sometimes produced by means of a dandy roll in which the pattern is formed by depressions in the surface. The paper produced with such a roll is thicker where the pattern is formed than in the rest of the sheet. Imitation watermarks are sometimes produced on the finished paper by subjecting it to pressure in contact with plates on which the design has been produced in relief.

The dandy roll is usually placed between the suction boxes. A machine equipped with six suction boxes under the wire commonly has the dandy located so that two suction boxes prepare the sheet for the action of the dandy, and the remaining four boxes extract more water from the sheet before it passes to the couch roll. The dandy should be placed between two table rolls, and never should it be placed right over a table roll. The distance between centers of the table rolls should never be large enough to cause sagging of the wire beneath the dandy.

U-shaped bearings support the dandy in such a way that its weight always rests on the paper. It must simply rest but never drag on the paper. Sometimes the dandy does not press across the entire width of the sheet, thus causing a break in the wet streak that is always present under the dandy at the place where it touches the paper.

Dandy rolls must be kept clean. This cleaning is usually done with a shower from a pipe that is attached to the supports of the dandy roll. A wiper is located back of this shower, which aids in keeping the dandy roll smooth and free from stock. Internal showers are provided in the construction of some dandies. As soon as a dandy roll is dirty, it begins to pick up the sheet persistently. It must be removed and cleaned. It is done by placing the machine tender at the front end and the back tender at the back end, and carefully lifting the roll from its bearings. This can be done without breaking the sheet. The roll is then up-ended and placed on supports, where it is cleaned with very dilute sulphuric acid. The acid is applied with a wire scrubbing brush in a thorough but careful manner. It is then washed off with clean water. Steam is sometimes used for cleaning a roll. After cleaning, the roll is ready to be reinserted into its position on the machine. It is replaced in the same way as it was removed. A little twirl in the direction of the movement of the wire is given to the roll when it is placed into position, and if properly done the paper will not be broken.

The sheet should not be run too wet under the dandy roll, as it would cause crush marks, which give to the paper a crushed or cloudy appearance. Sometimes the crushing is very difficult to prevent because of the kind of stock being run. Likewise the sheet must never be run too dry, as it causes the dandy to pick it up in places. Sometimes holes or breaks are made in the paper, but more often the sheet is lifted slightly from the wire and then dropped back into position, causing a defect in the sheet which resembles a blister, especially in the making of papers with watermarks. It is necessary in the operation of a paper machine to have a constant, uniform and correct amount of water in the sheet under the dandy roll.

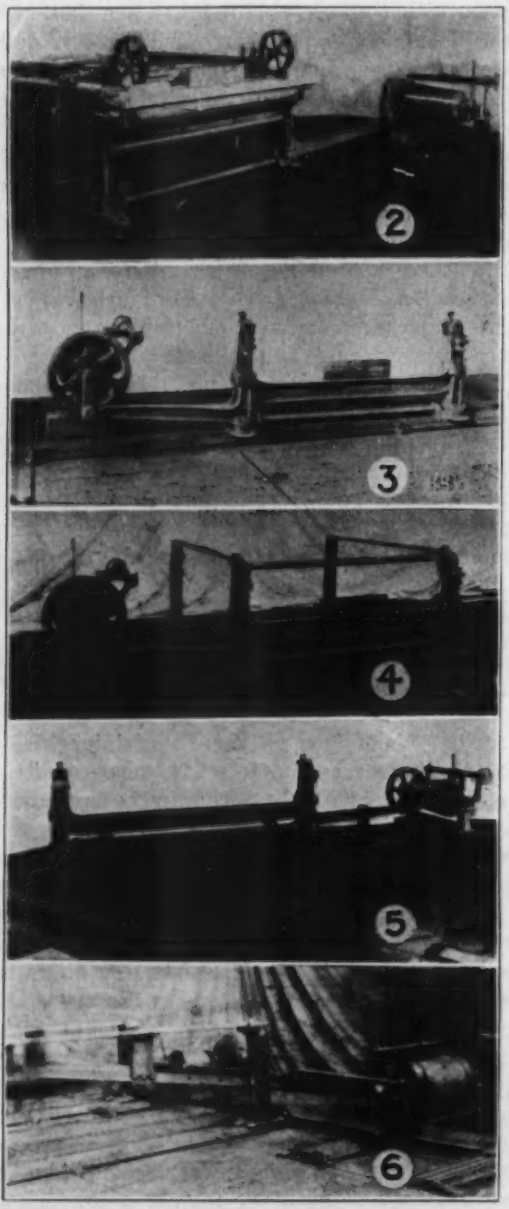
Shaking Arrangement

As the fibers flow on the Fourdrinier wire they have a natural tendency to set themselves with their lengths parallel with the flow or in the same direction as the movement of the machine. Were this condition permitted to pass wholly unchecked, the paper produced would be very weak when tested at right angles to its length. Hand-made paper is as strong in one direction as in the other because the vatman, by properly shaking the mold, causes the fibers to felt together at all angles. It is necessary that the Fourdrinier wire be given the equivalent of this shaking motion in so far as it is possible, so that the sheet of paper produced shall be properly felted. According to Mr. Lansing,* the maximum interlacing, webbing and felting take place at the point where the water has been so reduced that the individual fibers drop against and jostle one another to produce a close texture of paper, and it is at that point that the maximum shake of the wire should be applied.

Many methods have been tried to impart the "shake" to the wire cloth. It will be only possible to take up the history of the development of shaking machinery for Fourdrinier parts as developed by one of our leading paper machine builders. The first type of shake developed by them was called the Monu-

*Paper, April 7, 1915.

mental Shake Head. It was an upright type and consisted of a vertical cast-iron column with a revolving shaft contained in its center. On the upper end of the shaft was a heavy flywheel and crank pin. At the lower end of the shaft and contained in the base or the pediment on which the round column stood were



Courtesy of Pusey & Jones Co.

1—Revolving Shake Head. 2—Bell Crank Shake. 3—Savery Shake. 4—Savery Shake with Bars, Etc. 5—Development of Savery Shake. 6—Savery New Shake.

a pair of bevel gears. One of the gears was placed on the lower end of the vertical shaft and the other on the end of a horizontal shaft which extended out through a window in the pediment and carried a cone or perhaps three small step pulleys to vary the number of shakes per minute. The second development, as shown in Fig. 1, was also an upright type. The crank pin in the first and second types was adjustable in its throw from zero to about ⅝ eccentricity. From the crank pin there extended over a connecting rod of a usual length of 5 feet or 6 feet to a corresponding pin in the top of the cast-iron extension of the back shake post.

The back shake post can be imagined from Fig. 2 by supposing the arm, which is shown extending along the floor and a few inches above it and cast with the back shake post, to be so cast on the post as to reach upwards instead of out horizontally. The back shake post was connected to the front shake post by a connecting rod journaled on pins just under the breast roll, and each shake post was pivoted at its bottom or floor end on journal pins carried in foot castings, which were tied rigidly together by another rigid bar, and also by being firmly bolted to the foundation plates of the machine.

The third type was the bell crank shake and is illustrated in Fig 2. The long horizontal arm from the back shake post was moved up and down by a connecting rod from the flywheel crank pin of a low compact shake head operated by a 3-inch or 4-inch belt on a wide-faced cone, which was clutched to or disengaged from the horizontal flywheel shaft by a friction clutch.

The next improvement is illustrated in Figs. 3 and 4. It consisted of a long cast-iron rigid "U" frame, the upturned ends of which formed the back and front shake posts, and were tied very rigidly together and moved horizontally and in unison through the lower portion of the "U." This "U" frame was carried by double links front and back, and the fulcrum feet carrying these links were also rigidly connected together by a brace bar and by being bolted to the front plates. The two shake rails and the first small table roll are shown in Fig. 4.

A decided improvement on the last mentioned shake is shown in Fig. 5. It consists in the introduction of a pair of buffer springs, located at the front and back ends of the rigid tie bar, and forming buffers for the two lugs attached to the bottom of the "U" frame and serving to check the extreme throw or shaking movement of the "U" frame and its heavy load of Fourdrinier parts. This arrangement also included a spring attached to the horizontal shake arm to assist in balancing the weight of this arm. The action of these buffer springs was very fine, and this construction has been maintained for quite a number of years past.

The most recent development is shown in Fig. 6, in which the improvement consisted in carrying the two ends of the "U" frame on vertical flat springs instead of on the double links with pin journals, as previously illustrated. In practice it has been found that vertical flat springs rigidly bolted at lower and upper ends, and therefore without wear or need of lubrication, excel the rock pins.

(*Continued in January issue*)

Power Plant Management

Boiler Water Treatment—Part II

By ROBERT JUNE, M. E.

IN OUR preceding article we dealt with the nature of the various impurities in boiler feed water, and the operating troubles resulting from them. We have now to consider the various methods in use of treating bad water.

According to our previous outline, the neutralization or elimination of impurities in feed water may be effected by one or more of the following methods:

I. By chemical means.
   (a) Boiler compounds.
   (b) Water softening plants.
II. By mechanical means.
   (a) Tube cleaners.
   (b) Blow off.
   (c) Filter plants.
III. By thermal treatment.
   (a) Feed water heaters.
   (b) Distillation plants.

Boiler Compounds

There are a number of boiler compounds in use, but the base of most of these is carbonate of soda, to which caustic soda is sometimes added and occasionally phosphate of soda. In addition, materials containing tannin and starch are frequently added with the object of coating the particles of precipitated matter so as to prevent their cohesion.

The use of boiler compounds is sometimes condemned as thoroughly bad practice, the following contentions being made: that mechanical difficulties prevent the maintenance of proper ratio between the amount of compound used and the volume of water; that it is very difficult to control the treatment to take care of the changing analysis of the water; that adequate boiler compound treatment is very expensive; that compounds necessitate frequently blowing down the boiler to prevent an accumulation of sludge and sodium salts which cause foaming, and that moreover blowing down must frequently be supplemented by washing out and occasionally cutting out the boiler completely to remove all foreign matter.

Despite these criticisms, boiler compounds still find favor with many practical men, particularly in small boiler plants. When it comes to compounds, a great deal of care and attention must be paid to their selection and use. A great deal depends upon the attitude of the compound manufacturer. If he is willing to sit down and thresh out your problem with you, you may receive satisfactory service at a cost that is not prohibitive.

It is all simply a matter of relation of costs to the results obtained. While there are some compounds on the market which are worthless, and some manufacturers who offer cure-alls and do not give satisfactory service, there are other compounds which are reasonably satisfactory and do not involve a large plant investment. Though the weight of evidence is very much against the indiscriminate use of compounds, the fact remains that they are in satisfactory use in many small plants.

Graphite

Graphite has no retarding influence on the formation of scale, but it tends to prevent the scale from adhering firmly to the metal. The particles of graphite simply work through the minute fissures existing in the old scale and gradually penetrate between the scale and the metal. The scale thus loosened may be knocked off or removed with regular cleaning tools with little trouble.

Before starting the use of graphite, the boiler must first be thoroughly turbined. Once removed, the scale will not adhere firmly to the metal again as long as the graphite treatment is continued. The graphite also becomes intermixed with new scale as it forms, rendering it soft and friable. With graphite, as with boiler compounds, any boiler using bad water should be blown down a gauge or two every few hours to remove sludge.

Kerosene

Good results in softening scale are sometimes secured through the use of kerosene and other refined petroleum oils. This treatment changes the deposits of lime from a hard scale to a friable material which may be easily removed. If the treatment is to be effective, kerosene should be introduced after the boiler is emptied and washed, and the refilling should be effected from the bottom. If kerosene is fed into the boiler with the feed it may form a non-conducting film over the heating surface.

Zinc

While zinc is often introduced into boilers to prevent corrosion and scale formation, it does not as a matter of fact always accomplish this purpose, and it may even aggravate the trouble. The action of zinc is electrolytic, the theory being that a continuous flow of hydrogen is generated over the whole extent of the wet surface of the boiler. It is supposed that the continuous formation of the bubbles of hydrogen insulates the surface of the metal from the scale forming substances. If there is a little of the scale forming element it is precipitated and reduced to mud; if there is considerable, formed scale is produced which however does not adhere tightly to the surface of the metal and is consequently readily removed.

The zinc is introduced in the boiler where it is suspended in the water in the shape of blocks, slabs or shavings in a perforated container. In marine practice where zinc is in much greater use than in stationary boilers, it is usual to find zinc slabs 12″x6″x ½″ in use. One square inch of zinc surface is ordinarily supposed to be sufficient for 50 pounds of water in the boiler, although as a matter of fact the quantity of zinc used should be in proportion to the hardness of the water. The British Admiralty, who are advocates of zinc, recommend renewing of the slabs when their disintegration reaches a depth of ¼″.

Boiler Metal Treatment

A treatment which has in recent years come into quite wide use consists in the application of Perolin. This is a blue viscous non-volatile mineral liquid, which possesses the characteristic of an exceedingly high co-efficient of expansion. The liquid is injected into the boiler in small daily doses. It penetrates the pores and crevices in the scale and comes into direct contact with the metal, where like graphite it works its way along the steel, eventually forming an insulating coating between the scale and the tubes. The high co-efficient of expansion tends whenever the boiler is cut in to loosen any scale which has formed.

Advantages and Disadvantages of Compounds and Metal Treatment

Compounds and metal treatment of the various sorts described above possess the advantage of not requiring an initial plant investment, and of lending themselves very readily to experimentation. In case a given compound or treatment does not work, it may be modified, or another treatment may be tried. The operating costs are also less per gallon of water treated than where special treatment is installed.

The serious disadvantages of compounds and metal treatment are that under favorable conditions all that the most effective of these methods can do is to change the nature of the scale forming material from one which will be precipitated to one which will be carried in suspension. Frequent blowing off is at all times necessary with consequent heat losses, and as the accumulation of sludge can never be entirely removed while blowing off, so that the boiler is frequently cut in for washing. This puts the boiler out of commission and entails a loss on the investment in the boiler whenever an extra steam generator must be provided to take the place of those cut out for washing. Frequent cutting in and out of the boiler itself is an expensive operation. Taking everything into consideration, compounds and metal treatment are to be recommended for use primarily in small plants. In large plants and in particular where steam must be continuously generated, we must turn to a method of treating the water before it enters the boiler.

Water Softening and Purifying Plants

The treatment of water outside of the boiler through the medium of water softening plants is accomplished by either one of two processes known as the intermittent and the continuous.

Cold process plants are used primarily where water is required in very large quantities. Hot process plants are commonly used where exhaust steam is available for heating the water.

With the continuous system, the water to be treated flows to the softener in a continuous stream, while with the intermittent system it is treated in batches. Successful treatment in either case requires the proper proportioning of water and chemicals, thorough mixing and agitation, and the allowance of sufficient time for the reaction to take place so that all of the sludge may be removed from the water.

Lime and soda are the principal ingredients used in these processes, where sulphates of lime and magnesia are contained in the water, together with such quantities of carbonic acid or bicarbonate present as to impair the action of the soda. This is quite a common condition. The sulphates of lime and magnesia are broken down by the soda, and as much lime is added as is required to take up the carbonic acid not absorbed in the soda reaction.

Before dealing with the apparatus, it may be well to describe simply the chemical tests of the treated water which will enable us to interpret intelligently the results being obtained. Alkalinity, hardness and causticity, should, when the water is properly treated, be in the approximate relation of six, five and four. The use of too much lime will result in causticity being nearly equal to alkalinity. The use of too little lime will result in a causticity amounting to only about half the alkalinity. If too much soda is used, hardness, which should not be more than two points less than alkalinity, will be decreased below this amount, and the alkalinity correspondingly increased. Too little soda means an increase in hardness and a decrease in alkalinity. The tests are:

Alkalinity: Provide a standard solution of sulphuric acid. Put sufficient methyl orange in 50 cc. of the water being tested to color it. Measure out a quantity of the acid solution and put it in a drop at a time. As the acid solution is added, the mixture will begin to turn red. Shake the mixture and the redness will tend to disappear. Put in more acid and continue to shake. As the critical point is approached, the red will disappear more slowly. When the red color is prominent, the critical point has been reached. 1/10 cc. of the acid solution is equivalent to one degree of alkalinity.

Causticity: Use the same standard solution of sulphuric acid. To 50 cc. of the treated water add one drop of phenolphthalein dissolved in alcohol. This is to give the water a pinkish color. Put in a drop at a time of the acid solution, shaking after each addition. The critical point is reached when the color entirely disappears. 1/10 cc. of acid solution is equivalent to one degree of causticity.

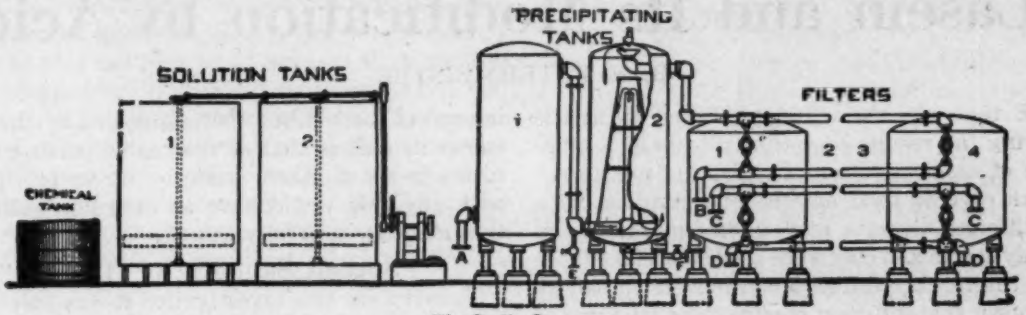
Hardness: Procure a standard soap solution. To 100 cc. of the water to be treated, add 1 cc. of the soap solution, and shake thoroughly. If the soap bubbles disappear, add another cc. of the soap solution. Enough of the soap solution must be added to make a permanent lather or foam from which the soap bubbles will not disappear after the shaking is discontinued.

To determine the excess of lime, add a small amount of silver nitrate to the treated water. If a milky white solution is formed the lime is not in excess. If the mixture turns brown there is too much lime.

The Scaife System

In the Scaife system, which is a continuous one, the feed water first enters the heater where it is brought to a temperature of 200 to 210 deg. F. As a portion of the CO_2 is driven off by the heat, carbonates of lime and magnesium are precipitated and deposited in removable pans inside the heater.

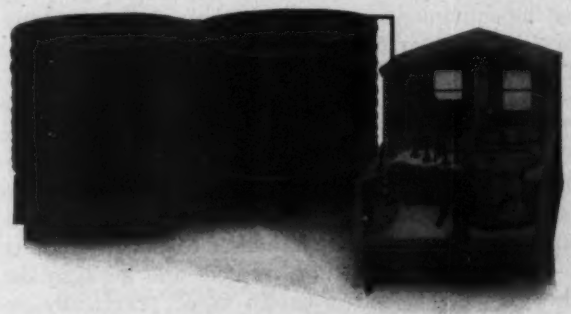
The system consists of a number of precipitating tanks with one or more pressure filters, all built to operate under boiler pressure, and the necessary solution tanks, pumps and controlling devices. The precipitating tanks may be either horizontal or vertical, depending upon the space available. The solution tanks hold sufficient quantity of chemicals to operate the plant from eight to twelve hours. The small pumps deliver this solution to the precipitating tanks, which are so constructed that the water is kept constantly moving and the chemicals are intimately and thoroughly mixed. In this manner acids are neutralized and the scale forming substances are changed to insolubles which sink in the form of heavy precipitates to the bottom of the tank, whence they are readily removed. From the precipitating tanks the mixture moves to the filters where the lighter substances in suspension are effectively removed.



The Scaife System

We-Fu-Go System

The We-Fu-Go is an intermittent process. The system consists essentially of one or more solution tanks from which the chemicals are taken, and one or more settling tanks into which the water to be treated and the chemicals are introduced, and of one or more filters. A thorough mixture of the chemicals and the water in the settling tank is effected by the use of mechanically operated paddles located near the bottom of the tanks. After the tank has been filled, agitation is discontinued, and the precipitate is allowed to settle to the bottom of the tank. The softened water is taken out of the tank by means of a hinged floating outlet pipe, arranged to rise and fall with the level of the water, so that the water is always drawn from the top, where there is the least amount of sludge. From the settling tanks the water flows by gravity into the filters, which remove all remaining solid matter which has not dropped to the bottom of the settling tank.



The We-Fu-Go System

From the filter the purified water again flows by gravity into the clear water storage reservoir from which it is pumped to the open heater and thence to the boiler. As a general rule duplicate systems are employed, so that while one tank is being filled, treated, and settled, the other is supplying finished water.

It should be understood of course that the above descriptions of the Scaife and We-Fu-Go systems are general in nature, as modifications of both of these systems are often made to meet special conditions.

In our next article we will deal with the operation and maintenance of the water softening plants described in this article, and we will also take up in detail the design, construction and operation of Zeolite plants.

Casein and Its Modification by Acid

By E. SUTERMEISTER

SOME time ago the writer published an article giving the results of viscosity tests of a number of casein solutions and coating mixtures.* This work covered tests of solutions prepared with several different solvents, and of coating mixtures in which only casein and clay were used, as well as those in which casein, clay and satin white were employed. It was shown that different caseins gave solutions of very different viscosities and that this property was greatly influenced by the kind and amount of solvent used. Moreover it was demonstrated that the method of testing was a most excellent one for determining the best solvent to use, the most satisfactory amount to employ, and the grade of coating for which the casein was most suitable.

There has been in the past more or less difference of opinion as to what properties are desired in a casein for coated paper work. Some plants have preferred one giving a coating mixture with a good deal of "body" while others have desired greater fluidity, and the choice has apparently depended upon the coating equipment available, the grade of work being done and the personal opinion of the man in charge of the plant. More recently, however, expressions of opinion from a considerable number of coating plant operators seem to indicate that the preference for self-soured casein is becoming more general. Unfortunately, little self-soured casein is made in this country because the process is slow and therefore requires large tank volume to handle the large amounts of milk which have to be treated, and because the whey from self-soured casein is of practically no value for making milk sugar. For these reasons, there is apparently little chance that the amount of self-soured casein made in this country will increase to any great extent.

There are one or two processes for making casein which give products of practically as good working properties as the self-soured casein, but there are certain features about these processes which make them undesirable for some of the casein producers; or at least they are less desirable than the usual acid processes. Because of these objections it seemed important, both from the standpoint of the casein maker as well as that of the coated paper manufacturer, to see if casein made by direct precipitation with any acid would have as desirable qualities as that made by natural souring.

Special Samples for Testing

To carry out this investigation it was necessary to have samples of casein, prepared under carefully regulated conditions, which were known to be precipitated by a number of the different acids that might possibly be used commercially. For certain reasons it seemed best to try out as well caseins prepared by mixtures of some of these acids. These special samples of casein were obtained through the co-operation of the sheffield By-Products Co., of Hobart, N. Y., who prepared them especially for this work. They were all prepared from the same quality of skim milk, on the same day and in the same manner. Precipitation was carried out in every case at a temperature of 136° F. and the resulting curd was not cooked in hot water but was simply washed with cold water, pressed and dried. All samples of curd acted in about the same way except those precipitated with lactic acid and with mixed lactic and muriatic acids. These two samples required about ten hours longer to dry than the others, the temperature being the same.

The acids used in the preparation of these caseins were: Sulphuric, phosphoric, acetic, lactic, muriatic, phosphoric and muriatic, acetic and muriatic, lactic and muriatic.

The amount of each acid used is not known, nor are the relative proportions of the two when they were used in mixtures. It was left entirely to the judgment of the casein maker to use them in such mounts and at such dilutions that good results were obtained in the precipitation and clotting together of the curd.

It was intended to compare these caseins with one prepared from the same skim milk by allowing it to sour naturally, but through a misunderstanding this sample was not prepared until later. So far as is known the grade of milk used in making this sample was the same as that for the others and it has been used for comparative tests just as though it had been made at the same time.

* Paper, April 23, 1919.

The samples when received at the laboratory for testing were in the form of dry, coarse curd, and before proceeding with the tests each was ground in a small coffee mill, running it through several times to insure uniform grinding and thorough mixing. In doing this, especial care was taken to see that no mixing of the different lots took place because of material which might have collected back of the grinder plate. After grinding, all of the caseins which had been precipitated by acid had the usual bright appearance of well made, acid treated caseins, while the natural soured sample was somewhat duller in appearance. The lactic acid sample was of a rather dark, reddish brown color, somewhat resembling ground glue; that made with mixed lactic and muriatic acids was also brownish in color but not nearly so dark as that prepared with lactic acid only; while the sample with phosphoric and muriatic acids was decidedly gray which was due to the presence of dirt. All the other samples were of the normal light color of well made caseins.

When outlining this work it seemed quite probable that the greatest differences in these caseins would appear in the viscosity tests, yet it was thought best to put them through the usual tests for solubility and adhesive strength.

Solubility with Borax

The solubility when borax was used as a solvent was determined by heating 50 grams of casein with 4 grams of borax dissolved in 200 grams of water. It was anticipated that this amount of borax (8 percent on the weight of the casein), would give an incomplete solution with an acid reaction, but after heating and stirring thoroughly it was found that the reaction was alkaline in every case except that of the natural soured casein. With the latter the solution was slightly acid when 8 percent of borax was used, neutral to litmus when 10 percent had been added, but it was not until 14 percent was added that a complete solution was obtained. The sulphuric casein required 10 percent of borax to give a complete solution, but the remaining seven samples were completely soluble when 8 percent of borax was used. All solutions except that of the natural soured casein were very opaque. In color the solution of the natural soured casein was quite yellow, those of the lactic and lactic-muriatic caseins were slightly brownish while all others were very white.

The consistency of the solutions was noted both hot and cold when four parts of water were used to each part of casein, and also after diluting with two additional parts of water and allowing the solutions to cool to room temperature. Each of the eight caseins prepared by precipitation with acid, when dissolved in four parts of water, gave a solution which was very thick when hot and which set to a rubbery jelly when cold. The differences between these solutions were not very great though those with acetic, muriatic and phosphoric-muriatic caseins were probably the thickest and that with sulphuric casein the thinnest. This latter was not nearly so thin as that of a French or Argentine casein and from its consistency it would ordinarily have been classed as a muriatic casein.

After the solutions had been diluted to contain 6 parts of water to each part of casein, and cooled to room temperature, the classification for consistency of solution was as follows:

Thickest: 1. Acetic.
2. Phosphoric.
3. Sulphuric and phosphoric-muriatic.
4. Muriatic and lactic-muriatic.
5. Lactic.
Thinnest: 6. Acetic-muriatic.

The difference between the thickest and the thinnest of these diluted solutions was merely that between a weak jelly and a very thick paste; the thinnest was not fluid enough to flow, while the thickest formed a brittle, slightly rubbery jelly.

Adhesive Strength

The method for determining the adhesive strength of casein has been fully described before.** Briefly it consists in dissolving the casein, mixing with clay in progressively increasing proportions, spreading these coating mixtures on small sheets of paper and when the latter are dry testing with sealing wax to see how much casein is necessary to hold 100 parts of clay on the surface of the paper. For making these tests the casein solutions were prepared by treating 50 grams of casein with 1.5 cc. of 90° ammonia, 4.6 grams of trisodium phosphate and 2.8 grams of borax dissolved in 200 cc. of water. This treatment gave a thin, opaque and complete solution with each of the caseins. The solutions of lactic and lactic-muriatic caseins were darker than the others which were all rather white with the exception of the self-soured casein which gave a yellowish solution as it did with borax.

The strength tests on these caseins, expressed as parts of casein per 100 parts of clay are as follows:

Lactic	8 parts
Lactic-muriatic	8 parts
Phosphoric-muriatic	8 parts
Acetic	8-9 parts
Phosphoric	8-9 parts
Acetic-muriatic	8-9 parts
Muriatic	9 parts
Sulphuric	9 parts
Self soured	9-9.5 parts

Foaming

In preparing the casein solutions for use in the strength tests, observations were made on the amount of foam produced. The phosphoric casein was the only one which was much different from the others, developing considerably less foam, though

**Pulp and Paper Magazine of Canada, March 1, 1914.

far more than the average French casein. The foam on the other eight samples appeared to be about the same in amount though that on the muriatic, acetic and acetic-muriatic caseins seemed to be finer grained and a little more leathery than the other.

The foaming of these caseins as they were dissolved did not show the expected differences and on the whole the variations are not sufficiently pronounced so that it can be predicted that one kind will probably work better than another.

Viscosity Tests

Since the better grades of coated papers usually contain a considerable proportion of satin white it was decided to study the viscosity of coating mixtures made from these caseins together with clay and satin white.

The caseins were dissolved with 2½ grams of borax and 21 cc. of ammonia (90°) for 100 grams of casein, by heating on the steam bath to a temperature of approximately 176° F. As soon as the casein was completely dissolved, the solutions were cooled and adjusted by adding water until one gram of casein was present in six grams of solution. It was intended to cool the solutions to 100° F., but when they reached a temperature of 115° F., they became so thick that stirring was practically impossible. The very thinnest of the solutions, except that of the self-soured casein, when cooled to 115° F. would flow only with extreme slowness while the thickest would hardly flow at all. Their consistency was such that they could be peeled away from the glass of the beaker, leaving the latter perfectly clean. Their jelly-like characteristics permitted them to be broken up into more or less brittle fragments, which on standing would very slowly flow together again. In sharp contrast to these solutions of the acid precipitated caseins was that of the self-soured casein which was a thin fluid even when it was cooled to 100° F.

In preparing the mixtures for the viscosity tests, the materials were mixed in the following proportions:

Clay, 77 grams dry.
Satin white, 21 grams dry=65 grams paste.
Water, 63 cc.
Casein, 18 grams dry=108 grams solution.

The clay, satin white and water were first mixed to a smooth paste and then the casein solution added at a temperature of 115° F. The alkalinity of the satin white, as determined by titration, was equivalent to 26.8% of free lime ($Ca(OH)_2$) based on the bone dry material.

It was expected that the caseins precipitated by different acids would give mixtures of quite different viscosities, but in no case was any one of them thin enough to test in the viscosimeter. The thinnest was so thick that it could not be worked down to a smooth mixture and it would flow only very slowly, while the thickest was of such a consistency that the container could be turned upside down without spilling the contents. Although none of these could be tested in the viscosimeter, there were differences among them which permitted them to be graded roughly as follows:

Thickest: 1. Phosphoric-muriatic.
2. Acetic, lactic-muriatic, acetic-muriatic.
3. Muriatic, sulphuric.
Thinnest: 4. Lactic, phosphoric.

The natural soured casein acted quite differently from any of the others. As already stated its solution was quite thin and fluid at 100° F. and this solution mixed readily with clay and satin white and gave a mixture which had a viscosity of 22° MacMichael at 100° F.

Moisture and Ash Tests

Up to this point in the investigation, the outstanding features are that the natural soured casein is very different in its behavior from all those prepared by direct precipitation with acid and that the properties of the latter are hardly influenced at all by the nature of the acid used. This last result was so surprising that an examination of some of the chemical properties of the caseins was determined upon to see if further light could be thrown on the problem. The acidity of the samples was practically determined when the borax necessary for a neutral solution was estimated. The next step was the determination of the hygroscopic moisture and the percentage of ash. The results of these tests are given in the following table in which the percentages are based on the air dry casein used in the tests:

Casein	Moisture Percent	Ash Percent
Sulphuric	5.9	5.50
Phosphoric	6.3	6.42
Acetic	6.1	6.07
Lactic	5.4	6.36
Muriatic	6.1	6.02
Phosphoric-muriatic	6.3	6.57
Acetic-muriatic	5.5	6.23
Lactic-muriatic	6.0	6.09
Natural soured	5.4	2.98

The ash of the first eight samples was from white to light gray in color and it was infusible and quite bulky in character. That from the natural soured casein was pure white and much less bulky than the others. As would be expected all were found to consist very largely of calcium phosphate which was readily soluble in hydrochloric acid.

Treatment with Acids

These results suggested that possibly the difference between the natural soured casein and the other samples was due to the lower ash content of the former and that if the ash of the others could be reduced by treating them with acid, the working

properties of the coating mixtures might be very greatly improved. To try this out, 200 grams of the muriatic casein were soaked in 1000 cc. of water containing 10 cc. of pure hydrochloric acid (sp. gr. 1.20). After stirring at frequent intervals for an hour, it was filtered off on a suction filter and washed once with cold water. It was again stirred up with water, heated to 80° C. on the steam bath and finally squeezed as dry as possible, shredded and dried over a radiator. Two other samples were treated in this same way and in addition one was treated with sulphuric acid (10 cc. of sp. gr. 1.84) instead of the hydrochloric acid. The dried caseins were ground, tested for ash, and a sample of each dissolved with borax and ammonia, mixed with satin white and clay and the viscosity of the mixture determined. The results are as follows:

Casein used	Acid used	Percentage Ash before	Percentage Ash after	Viscosity after treatment
Muriatic	H Cl	6.02	2.30	33
Muriatic	H_2SO_4	6.02	3.02	Very thick cream
Acetic	H Cl	6.07	1.91	26
Phosphoric-muriatic	H Cl	6.57	2.34	26

Before treating with acid, all of these caseins gave mixtures which were so thick that they could not be tested for viscosity at all, so it is evident that the treatment with muriatic acid has caused a very marked improvement. Sulphuric acid is not so satisfactory for this work, probably because of the relatively slight solutility of calcium sulphate, and the casein so treated gave a coating mixture which was obviously too thick to be spread by the brushes of the coating machines.

In preparing the casein solutions for these viscosity tests, those from the samples treated with hydrochloric acid were found to be moderately thin, even when cooled to 100° F. They had much the appearance of solutions of high grade French caseins. As already mentioned these same caseins before treating with acid gave opaque and very thick, almost jelly-like, solutions when the same solvents were used. The sample which had been treated with sulphuric acid showed hardly any improvement over the untreated casein, as its solution was opaque and thick while hot, and almost a jelly when cold.

While both sulphuric and hydrochloric acids reduce the ash of the casein very materially, it is evident that hydrochloric is the more effective of the two, both in reducing the ash in the casein and in lowering the viscosity of the coating mixture prepared therefrom. The next step therefore was to see if smaller amounts of acid would give equally good results. The experiments were carried out in the same way as before except that smaller quantities of casein were used. The conditions of the experiments and the results which were obtained are as follows:

Casein used		C. C. Conc. H Cl used	Percent ash after treatment	Viscosity of coating mixture
Kind	Amt.			
Muriatic	100 gms.	1	4.49	340
Muriatic	100 gms.	3	2.69	78
Muriatic	100 gms.	5	2.30	25
Sulphuric	100 gms.	1	3.69	409
Sulphuric	100 gms.	3	2.77	51
Sulphuric	100 gms.	5	1.01	43

It was attempted to treat the sulphuric casein with 7½ cc. of hydrochloric acid for 100 grams of casein but on heating on the steam bath, after the preliminary washing, so much of the casein went into solution that the treatment was abandoned as impractical.

In dissolving and mixing these various samples, it was found that those treated with 1 cc. of acid were very thick and hard to mix; they were only moderately improved over the untreated caseins. When the acid was increased to 3 cc. per 100 grams of casein, the improvement was very marked and the coating mixtures with borax and ammonia as solvents were nearly fluid enough to use successfully. Treatment with 5 cc. of acid produces a type of casein which should be satisfactory for all grades of coatings.

The next question to receive attention was that of the effect of the acid treatment on the strength of the caseins. Three of the samples which had been treated with 5 cc. of acid for 100 grams of casein were therefore tested for strength in comparison with the untreated caseins. Two of these samples had been treated with muriatic and one with sulphuric acid. The results of these tests are as follows:

Kind of casein	Acid used	Strength in parts casein per 100 clay: After treating	Before treating
Acetic	H Cl	6–7	8–9
Phosphoric-muriatic	H Cl	6–7	8
Muriatic	H_2SO_4	6–7	9

It appears that the air dry casein after treating with acid is considerably stronger than the untreated casein. As it was quite obvious that the acid treatment dissolved part of the casein, as well as the ash, the next step was to see if this loss more than counterbalanced the gain in strength. To investigate this point, samples of 10 grams each of air dry muriatic casein were treated with 0.3 cc. and 0.5 cc. respectively of strong hydrochloric acid and the washing carried through as before, taking particular care to avoid mechanical losses. These treatments gave 8.36 grams and 8.04 grams of bone dry casein which at 6 percent moisture would be equivalent to 8.90 grams and 8.56 grams respectively of air dry casein. Assuming that the air dry casein at the start also con-

tained 6 percent of moisture, it is seen that the loss in weight due to the acid treatment amounts to 11.0 percent and 14.4 percent. If the losses of the other caseins already tested for strength were no greater than in the case of the muriatic casein, the gain in strength would a little more than offset the loss due to acid treatment and washing.

From this work it appears that a muriatic casein can be made to give as satisfactory results as a natural soured one, and that it is probably the amount of acid used in the precipitation rather than the kind which determines the quality of the casein. It seems probable that by properly adjusting the amount of acid used, the precipitation of the casein from the milk and its acid treatment can be carried out in the same operation, and the logical place to do this is in the creameries where the casein is made.

If, however, casein of satisfactory quality cannot be obtained, the user still has the chance to treat it with acid in his own plant and thereby make it equal to the best natural soured casein. If mechanical loss is avoided in doing this, it seems safe to say that the casein as usually weighed out could be treated with acid and, after washing, cooked up to the normal volume without considering the loss in the process. This fortunate circumstance would make it possible to use the process with a minimum of change in the usual formulae.

Pointers for the Engineer

By W. F. SCHAPHORST, M. E.

He Was Too Busy

THERE are good engineers and there are poor ones. Have you ever met the kind that are too busy to advance? Here is one that I have known for a number of years.

This man, single-handed, operates 2 boilers and a 100 h. p. noncondensing steam engine. Many years ago he was a helper, but was given complete charge when his boss, the former engineer, died.

His employers say he is a "wonder" and an "awfully hard worker." They raised his pay 15 years ago after he had proved beyond a shadow of a doubt that he could handle the whole job alone. And in getting him to do it all, and paying him the same wages his former boss had received, the employers thought they had driven an excellent bargain. To keep the plant going, he works night and day.

Talk to this man about superheaters, CO_2 recorders, or indicators, and he'll stare at you. He doesn't know what such things are for.

"Condensers," he says, "are no good because they don't take oil out of the water." Doubtless he heard his "old master" say that.

To him, efficiency has no meaning.

He chips the scale out of his boilers at night or on Sundays. He doesn't know that most of the scale can be precipitated outside of the boilers or prevented from adhering, and that coal can be saved in that way.

He has much trouble with his pump. Dirt particles get in and clog it. He knows no remedy save hard work to set the pump aright. In the old days, they didn't use strainers.

He knows nothing about oil and oiling systems. His methods are antediluvian. Everything is done by hand—by force. Intelligence is almost a zero quantity.

He does not want a helper for fear the helper would learn too quickly and displace him.

He always goes the long way 'round in making repairs because he knows no quick methods.

He orders and insists on old, out-of-date materials because he knows none better.

He doesn't associate with other engineers. He doesn't read a technical or trade paper. He hasn't time.

Arc of Contact

EVERY once in a while we read articles on the transmission of power by belts, in which intricate formulas are used. The writers of the articles seem to like to make belt transmission as complex as possible. Why they do so I do not know, because as Goldberg, the cartoonist would say, "It's all wrong, Sir Isaac Newton; it's all wrong." I have conversed with many a belt drive designer of the largest manufacturers in the country and they all pooh-pooh the complex formulas. Occasionally, perhaps, one will meet a theorist who looks on the importance of complex formulas with much seriousness, but I have not run across any of them yet, outside of our colleges.

For instance, theorists like to insert "arc of contact" into their formulas somewhere. I appreciate the fact that arc of contact has much to do with power transmission; but it is not very often that we have to contend with a belt that has much more or less contact than 180 degrees. It is generally assumed by drive designers that the arc of contact is about 180 degrees, and a sufficiently wide belt is used to allow for the slight difference that might be caused by a smaller or greater contact.

Ninety degrees, for example, is a very rare arc of contact. Yet I have seen table after table on the subject of pulleys and belts that start with 90 degrees contact. Then those selfsame tables stop with 180

degrees, just as though 180 degrees could be or is the limit of contact. Now, since arcs of contact greater than 180 degrees are common in practice, due to idlers or natural slackness of belts even though one of the pulleys may be considerably larger than the other, it is plain that there is little cause for worrying about arc of contact on the ordinary or average drive.

How Much Lubricant?

THE flywheel test is the best one I know of for determining the proper quantity of oil to use in a steam engine. The test is very simple. Just pull out your watch and take the time required for the engine to come to a stop after shutting off the steam. The longer the stopping time the better.

It is plain that if a flywheel weighs, say, 2,000 pounds, it has a definite amount of energy stored in it when running at normal speed. Therefore, when steam is suddenly shut off, an equal amount of energy is dissipated every time the engine stops. With all conditions the same, then, an exactly identical length of time will be consumed in stopping every time the throttle is closed. By noting the stopping time every night and by altering the quantity of lubricant fed to the engine every day, the proper amount is in time determined.

The important thing is that external conditions must be the same every time the stop test is made. If the engine drives a belted machine, it is therefore best to throw off the belt and take the stopping time with the engine running unloaded. Under that condition longer time is consumed in coming to a stop and comparison of stopping times is made easier. In other words, the test is more delicate.

Expansion Joints

EVER since metal pipes have been used, the care of expansion in long lines has been an important problem. Not so many years ago it was a very serious problem. All sorts of devices were employed varying all the way from swing and sliding joints to bellows-type expanders. Although all of these devices may be more or less successful, depending upon conditions, the method that is most popular today is the liberal use of pipe bends with Van Stone joints, provided space conditions permit.

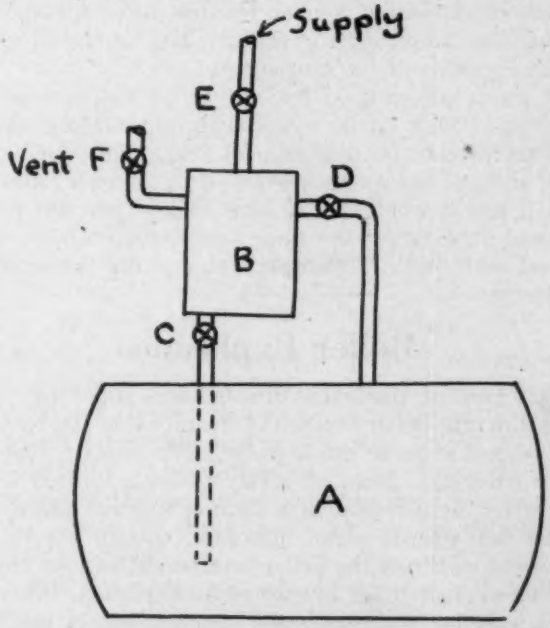
Where expansion must be effected in a straight line—where no loops or bends are practicable—the sliding joint or corrugated copper joint may be used. Of the two the corrugated type is preferable because it does not need packing, does not stick, does not require lubricant, and does not get out of alignment. By this I do not mean that ALL straight line expansion joints give trouble. The best ones do not give trouble. The trick is, therefore, to pick the BEST ones. The bellows-type is very often objectionable because if made of copper or alloy it will not carry steam of as high temperature as will a steel or iron pipe bend. Also, care must be exercised in the selection of the bellows-type expansion joint lest constant expansion and contraction may cause cracking in the corrugations. Before making a selection the advice of the manufacturer should be sought. All details as regards kind of service, external and internal temperatures, length of pipe, size of pipe, etc., should be given so that the manufacturer can advise intelligently.

A Simple Boiler Feeder

THE figure herewith shows how water can be fed into a boiler under pressure without the use of an injector or pump of any kind.

"A" is the boiler that is to be fed with water. "B" is a tank or vessel capable of withstanding as high steam pressure as the boiler itself.

Close valves "C" and "D" and open valve "E" and vent "F" so that tank "B" will fill with water through



the supply pipe. Then close valves "E" and "F" and open valves "C" and "D." Steam will enter "B" through the valve "D" and the water from "B" will flow downward through "C" due to gravity because the vessel "B" is now nothing more or less than a part of "A" and since water naturally seeks its level in pressure vessels as well as in the open atmosphere it will flow downward, "B" will empty and the water level in "A" will be raised. After "B" is empty close "C" and "D" again and open "E" and "F" and repeat the above process.

The writer is informed that a boiler feeding device of this kind is now on the market and that it is proving to be a success on large as well as small boilers. Its simplicity should certainly attract attention.

It is well to note in this connection, however, that SOME steam is required to do this work. When all

of the water is emptied out of "B" that vessel is full of steam, hence the volume of steam used is equal to the volume of water fed into the boiler. It is therefore a simple matter to compute the amount of steam required to feed a given quantity of water into a boiler with this apparatus.

Water or Air Cooling

ENGINEERS are sometimes asked and are unable to answer why condensers are water cooled rather than air cooled. It is argued that "air finally must absorb the heat anyhow so why not air cool the condenser in the first place"?

It is true that "air finally absorbs the heat anyhow," even in power plants but the water must first be sprayed into the air in order that its radiating surface may be made as large as possible to bring the temperature of the water down to the proper point again and what is more important the temperature of the water is often brought to a lower point than the temperature of the air. Much depends upon the humidity of the atmosphere.

Air is not so good for cooling intense heat as is water. That is a well-known engineering fact. Water is a better conductor of heat. Put your hand in air that has a temperature of 32 degrees Fahrenheit and it won't feel so very cold. Then put your hand in water of the same temperature and it will feel cold. Why? Because water is the better conductor.

Boiler Explosions

IN general, the water tube boiler is safer than the fire tube boiler because of the fact that the former does not store so much water. The late Dr. Robert H. Thurston, Dean of Sibley College, Cornell University, figured that in a plain cylindrical boiler under 100 pounds steam pressure, enough energy is stored to throw the boiler to a height of over three and one-half miles in case of an explosion. This is because hot water contains so much energy and because there is so much water in cylindrical boilers. He said: "A cubic foot of heated water under a pressure of from 60 to 70 pounds per square inch has about the same energy as one pound of gunpowder." This is one of the reasons why the water tube boiler is so often given preference to the fire tube boiler.

Fire tube boilers are generally large in diameter. The greater the diameter the greater must be the thickness of the metal to withstand the given pressure and consequently the greater the weight of steel necessary and the greater the cost. The water tube boiler again has the advantage in that the drums of water tube boilers seldom exceed 48 inches in diameter, hence the plate thickness is never excessive.

The tubes of the water tube boiler always come in contact with the most intense heat. However, since these tubes are comparatively small in diameter and of great strength they have a high factor of safety, much higher than the usual factor of safety of a fire tube boiler, the thick shell of which is exposed to the most intense heat.

Also, in the water tube boiler there are no compressive stresses whatever. Pressures always act from within both in the drums and in the tubes, consequently all metal is in tension. In the fire tube boiler the tubes are in compression and are always liable to collapse, especially when they become thin or when made in large diameters.

While it is true that water tube boilers sometimes explode, such explosions are almost invariably less dangerous than fire tube boiler explosions. Water tube boiler explosions seldom occur due to weak drums because the drums are well protected from intense heat. If there is any breaking or bursting at all it is usually a tube, and tube failures are seldom serious.

Uncovered Steam Pipes

ACCORDING to tests it has been shown that an average of 0.76 pounds of steam are wasted per hour due to every square foot of uncovered pipe. Thus, if a paper mill plant contains 100 square feet of uncovered surface we have 100 x 0.76=76 pounds of steam wasted per hour. If 7 pounds of steam are evaporated per pound of coal this means about 11 pounds of coal per hour, or a little over one ton of coal in 200 hours. On this basis it becomes easy to determine the approximate loss to any paper mill due to uncovered pipe.

Half Stuff

We are interested to note that certain English scientists are adapting rubber to the manufacture of paper. We sincerely hope newsprint manufacturers don't get wind of this invention. Newspapers have a facility of "stretching" the truth enough as it is, without putting rubber into the sheet.

If you expect to pick fruit off your family tree you want to make up your mind you'll have to climb for it.

One imaginative writer attempted to picture the situation in this country if everything made of paper were to instantly disappear. But shucks, this is tame to what would happen if every bit of paper were to instantly disappear from Germany.

Our idea of a mean man is a paper mill superintendent who believes all the milk of human kindness should be made into casein.

A Boiler House in the Paper Industry

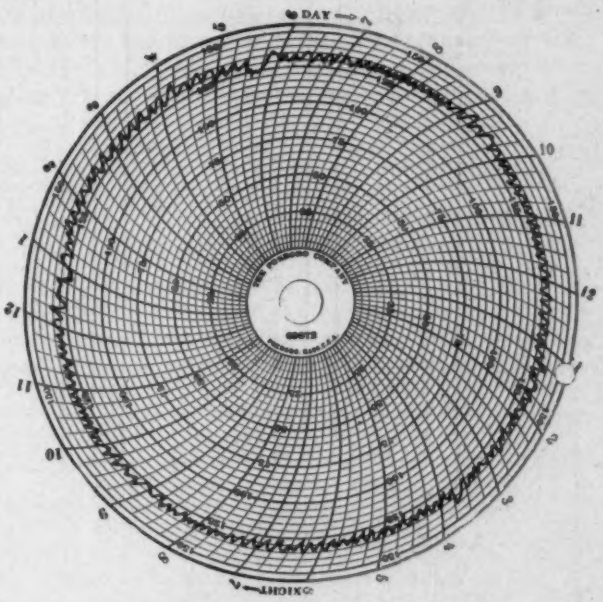
By JOHN A. KAGERHUBER, M. E.

PULP and paper mills are generally running 24 hours per day and six days per week. It is therefore essential that the boiler house contains the best equipment obtainable, but not only that, it also requires good reliable firemen and most of all a wide awake and up to date foreman, and besides a man higher up, who is really interested that steam be produced with the least amount of coal. Only in late years have paper mill managers come to the conclusion that the boiler house is the most important department of the whole plant, and much time is being spent nowadays with seeing that the boiler house is being run economically. It is a well known fact that a variation of steam pressure is very influential in the production of paper; therefore, it is important that steam pressure is being kept constant.

The accompanying steam chart is from the boiler house of the Bayless Mfg. Corp. and shows practically no variation in pressure. This is not a selected chart, however, as the steam pressure in this plant remains the same day for day throughout the year. It may be interesting to the reader to know that the above plant is not equipped with modern equipment. There are still 4-250 H. P. Dutch-Oven type boiler, stoker fired on one side and hand fired on the other; 4-250 H. P. Dutch-Oven type boiler, hand fired on both sides; 2-300 H. P. Wickes boiler, stoker fired and, lastly, 2 modern Badenhausen boilers, stoker fired, and yet satisfactory results are being obtained, which is chiefly due, as the writer sees it, to the ever alert and observing general manager of the plant.

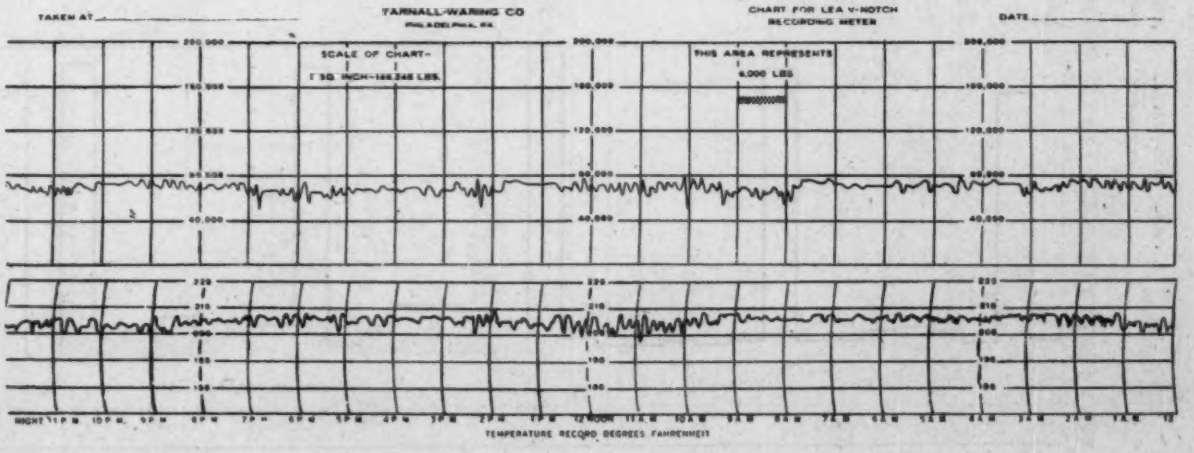
One can see on the accompanying feed water chart that the firemen are always watchful that the feed water is being kept level in the boilers, although the feed water is still introduced into the boilers by hand regulation. They also believe in keeping feed water at as high a temperature as possible. The accompanying temperature chart shows practically no variation.

To create and keep up the interest of the firemen, one should keep constantly before them graphic



charts on daily consumption of coal compared with the amount of coal used during the same day or month of a year or two previous. The chart herewith shows consumption of coal during March, 1917, in heavy line, and consumption of coal during the same period of 1920 in dotted line, then the double parallel line across the chart shows the average obtained in both periods.

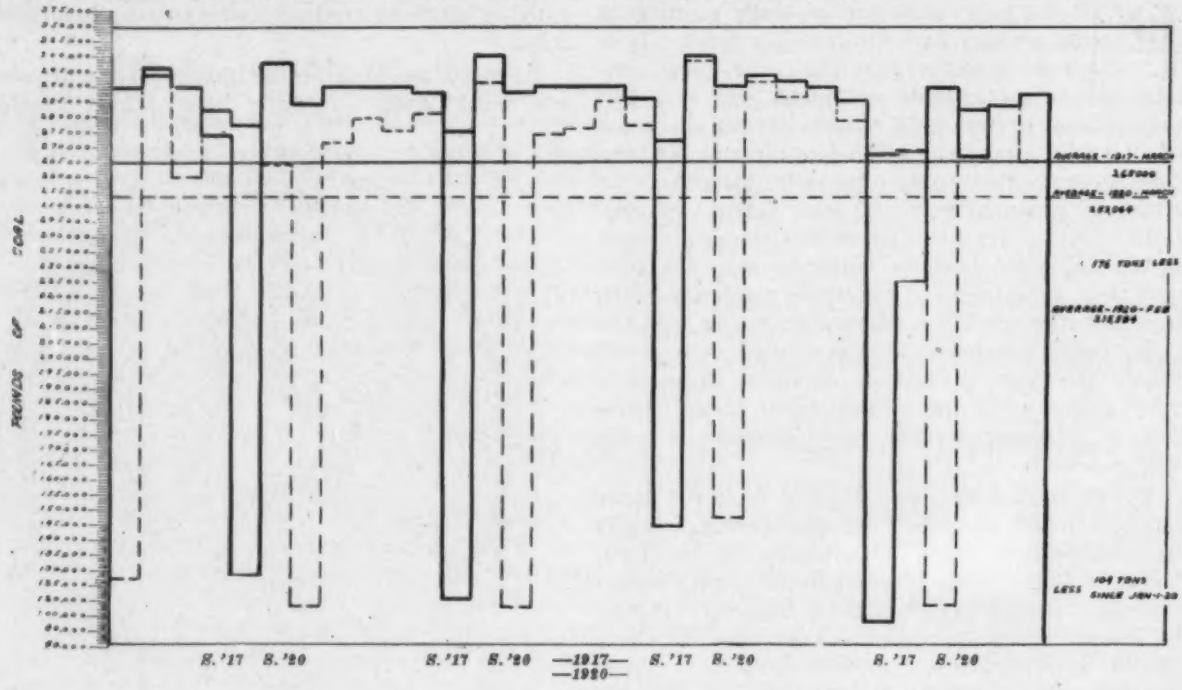
The men in the boiler house are also interested in what is going on in other departments, and a chart is followed up daily, showing coal consumed and paper

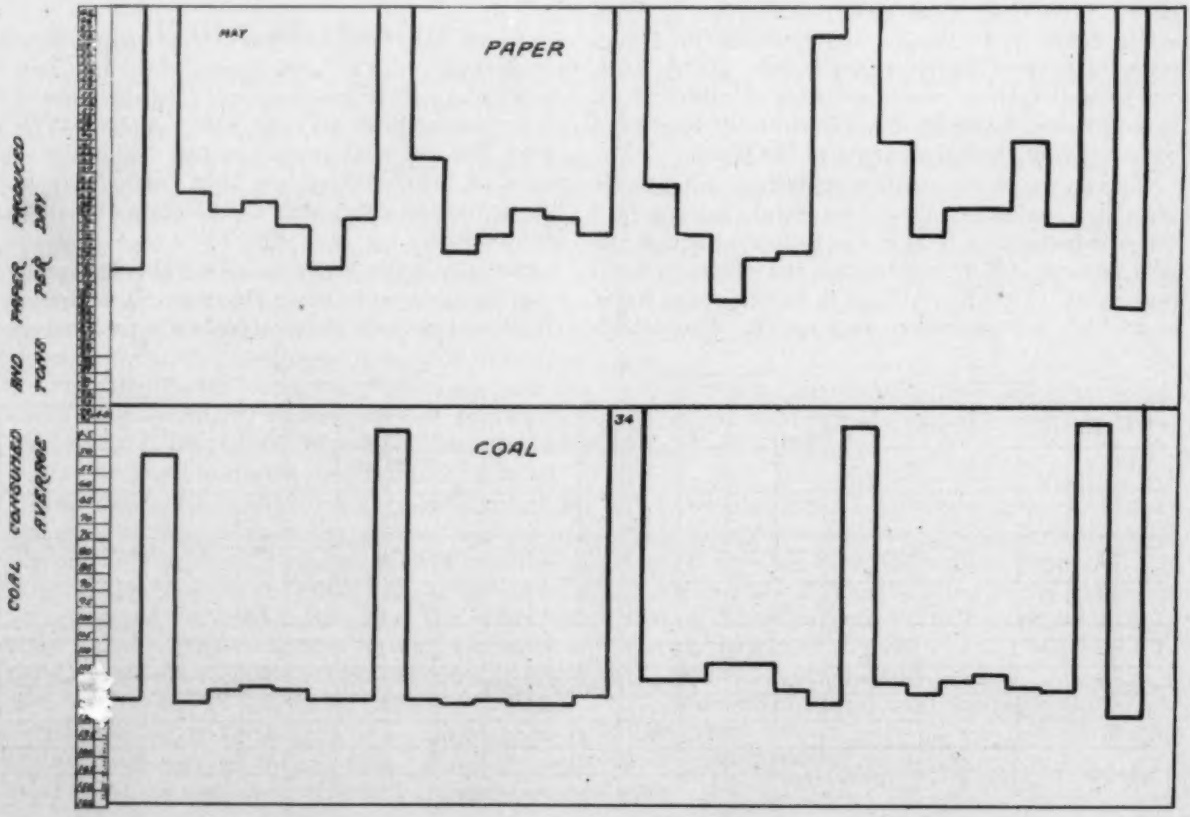


produced in average tons per day, the upper part shows paper produced daily and the lower part coal consumed in tons.

A complete description of waste in the boiler house and the way in which to reduce it without any expense will be published in the next month's issue.

Apathy, recklessness, antagonism are mental wastes which the safety habit will kill, says the National Safety Council.





Many Low Head Water Powers May Be Developed

By DONALD M. McLEAN
Associate E. I. C.

THE strong demand for higher speeds than those attainable with the Francis turbine runner, even in its most refined development, on account of the economical influence such higher speeds have upon the entire design of any proposed hydraulic installation, has led to intensive study on the part of turbine designers in Europe and America during recent years. The result has been a distinct departure from the Francis type runner, and as there is a certain resemblance between the new high speed models as developed by engineers in various parts of the world, and as they all bear some likeness to a ship propeller, they have come to be known, in general, as of the propeller type, and the name of the original designer is usually coupled with them. The leading types of propeller runners are tabled below:

Name	Designer	Location
The Kaplan Runner,	Victor Kaplan,	Austria.
The Dubs Runner,	Robert Dubs,	Switzerland.
The Nagler Runner,	Forest Nagler,	Milwaukee, Wis.
The Moody Diagonal Runner,	Lewis F. Moody,	Philadelphia, Pa.

These several types of turbine runners may be said to differ from each other principally in the direction of the flow of the water through the runner proper. For instance, in the Nagler and Kaplan types, the flow is axial or parallel with the wheel shaft. In the

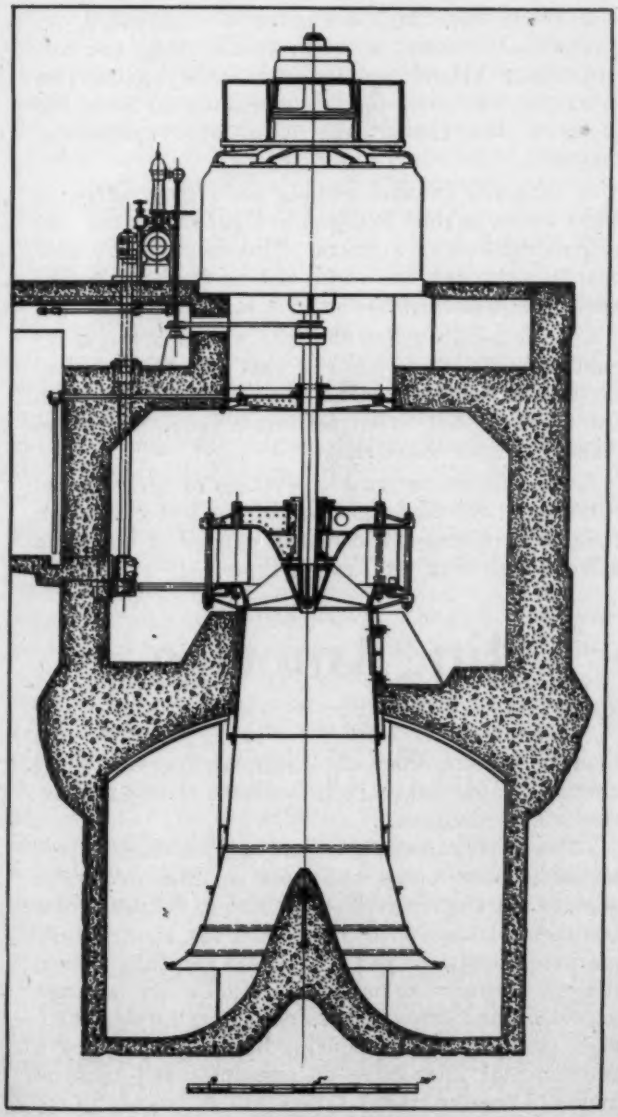


Figure 3

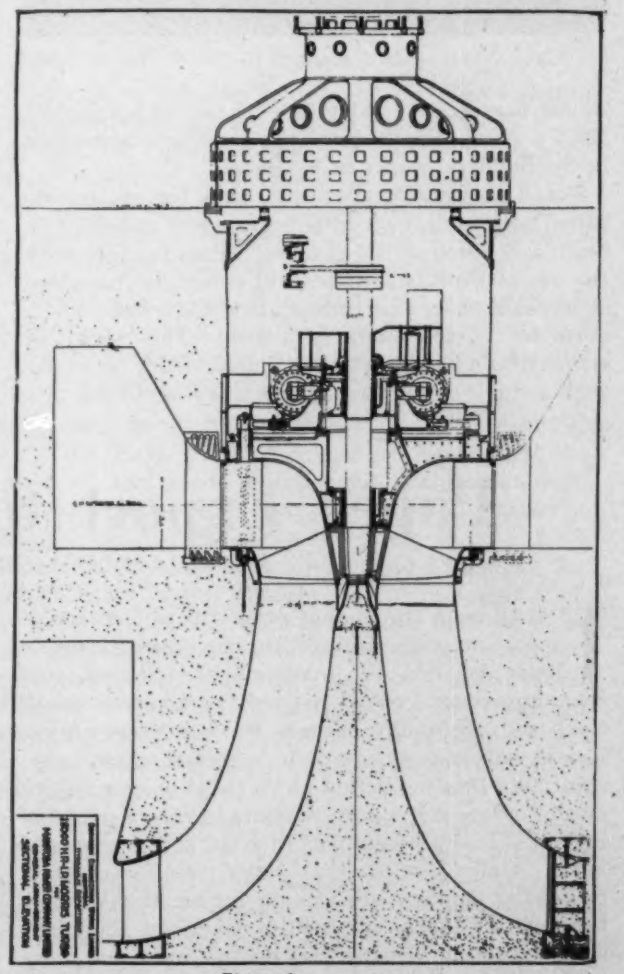


Figure 1

Dubs runner, the flow is partly axial and partly approaching the radial direction. The Moody diagonal runner, the latest development in its class, takes its name from the fact that the flow is in a diagonal direction with relation to the axis of the shaft.

The sectional illustrations shown herewith all present applications of the Moody diagonal runner. Fig. 1 shows an I. P. Morris turbine unit to develop

Figure 2

28,000 horsepower under 56 ft. head, at a speed of 138.5 r. p. m. Fig. 2 shows the same unit assembled in the builders' works at Montreal.

Fig. 3 shows a smaller unit, built for an Ontario paper mill, to develop 1400 horsepower under 29 ft. head, at a speed of 225 r. p. m. Those familiar with the use of Francis turbines will recognize this speed as unusual under this comparatively low head, using a runner of the diameter shown. This speed, of course, could not have been attained under this head with a single runner but for the adoption of the propeller type.

The outstanding feature apparent on consideration of these typical large and small installations is the evidence that it is now possible to profitably develop many low head propositions which in the past have not stood analysis on the ground of the heavy capital investment necessary in order to utilize them, although in many instances they were attractive as regards nearness to railways, sources of raw material, etc.

In particular, some of the economies obtainable by the use of the higher speeds made available by this new type of runner are as follows:

1. In a hydro-electric unit the first cost of the generator is much less, and due to the reduction in weights of parts of the generator and turbine, smaller cranes are necessary, and the general construction of the power house may be designed for lighter loads, reducing the first cost of the development very materially.

2. While the diagonal runner is unshrouded, its mechanical strength is much greater than the corresponding Francis runner, the vanes having less overhang, and there being opportunity to unite the vanes to the runner hub in a more substantial manner.

3. Diagonal runners usually have from three to eight vanes, against fourteen to eighteen for the corresponding Francis runners. This means large, free openings through the vanes and no clogging, consequently intake rack bar spacing may be wider.

4. It is usually found that the weight of the diagonal runner is about one-half that of a Francis runner for the same conditions. This fact, together with the higher speed, often permits a reduction in the diameter of the wheel shaft.

5. The simple design of the vanes of the diagonal runner and the direct passage of the water through them very greatly reduces the danger of corrosion as compared with the Francis type.

Paper Export to Latin America

By H. M. GRASSELT

IT HAS been stated that even with the return of keen European competition, our paper export to Latin America will increase apace with the general improvement of international commercial conditions and eventually surpass its war-time volume. Recent developments have to a certain extent substantiated that prediction and a steadily growing inflow of orders and inquiries points toward a complete revival of business relations with our southern neighbors. It also signifies that paper manufacturers in increasing numbers are looking for business connections with Central and South American countries, since exporting of paper has become more and more an economic necessity. Many lines have developed to such a point that either foreign markets must needs be found to absorb the surplus or else production will be curtailed.

Latin American markets hold many attractive possibilities of commerce, and paper manufacturers who wish to more extensively enter into or establish new business relations with those countries, should study markets, conditions and people very carefully. Even if the manufacturer has no intention of doing direct exporting and contemplates doing his foreign business through export houses, he should acquire a fundamental knowledge of principles and requirements of foreign trade.

Although signal progress has been made in the

past few years toward a better understanding of Latin American trade conditions and its peculiarities, much remains to be done to build up lasting and profitable business relations.

The average Latin American business man is conservative; he wishes his goods in precisely the form to which he is accustomed. He invariably expects the goods to be manufactured to sample. To "dump" commodities not good enough for domestic consumption in some South American market would not only irreparably injure the individual offender but also the whole American trade and its prestige.

During the war complaints about poor quality of paper were quite frequent. In many cases shipments did not conform to sample, because the manufacturer assumed that the foreign buyer would not complain about a slight deviation from quality, color or finish. Very often the buyer did not complain for the simple reason that he needed the goods badly and had no other sources of supply. However, as soon as the armistice became effective in November, 1918, wholesale cancelations of export orders began to pour in and our foreign business came to almost a standstill. Important economical factors were, of course, the immediate cause of the momentary cessation of our paper export business, but it must be emphasized that poor quality, disregard of the buyer's instructions and inadequate packing had a certain bearing on those occurrences.

Export business is by no means as difficult and intricate as it may look to the uninitiated. Trade customs today are fairly universal, transportation facilities adequate and the establishing of branches of American banking houses and chambers of commerce in principal Latin American cities has created a highly developed and reliable credit system.

The manufacturer, who intends to sell and ship direct to the Latin American trade (Direct Exporting) must study those markets to which he wishes to sell and follow carefully evolved plans. He has to find out which particular markets offer the best opportunities for the sale of his product, and how transportation and tariff will affect his selling prices. Furthermore, some markets might require paper in certain sizes unsuited to the width of his machines, others, certain weights, colors or finishes, which he does not care to make or cannot furnish with his equipment. The Department of Commerce or the Pan-American Union in Washington, likewise our consuls and Chambers of Commerce in many Latin American cities will give valuable advice on these matters.

Obtaining Foreign Business

There exist several ways and means to obtain Latin American business for direct export. Traveling salesmen are sent out to solicit business. These men ought to possess at least a working knowledge of the Spanish language or of Portuguese if Brazilian business is desired. Selling through advertisements in export magazines or daily papers and a carefully laid-out advertising campaign in discretively selected publications may yield excellent results. Selling by correspondence is, in many instances, practicable and effective. Latin Americans are formal in their business dealings and correspondence. Therefore, the language employed in correspondence with them must be exact and courtly and should be carried on in Spanish or Portuguese whenever possible. A Brazilian, whose language is Portuguese, may have his sensitive national pride hurt by a letter in Spanish, although he can easily read and understand that language. Many exporters, especially Europeans, consider the resident foreign agent as the surest source of obtaining and establishing advantageously the business with foreign markets. The resident foreign agent has the advantage of being in continuous personal contact with buyers in his territory and knowing their language, customs and requirements better than the foreigner many thousand miles away. The foreign agent is not a buyer of goods but a salesman who introduces new lines or maintains the trade already established and receives a commission on his sales. Some of these men, however, represent so many different houses and goods that they cannot devote sufficient time to a certain commodity.

The most valuable representation the exporting manufacturers can have in foreign countries is, of course, the Foreign Branch, but since only a very large volume of business will warrant the establishing of such a branch, the great majority of direct exporters will have to resort to one or the other of the preceding mentioned intermediaries.

Prices may be quoted in dollars, but it is advisable that the exporting manufacturer familiarize himself with the monetary system of the various Central and South American republics.

Quotations are made either F. O. B., F. A. S. or C. I. F. F. O. B. (free on board) means that the price of the goods includes all charges, railroad freight, lighterage, if any, pier dues and placing of the shipment on the outgoing vessel. F. A. S. (free alongside) is quoted as applying to shipments for which extra loading charges may be imposed. C. I. F. (cost, insurance, freight) signifies that the shipper will bear costs f. o. b. vessel, pay the premium of a marine insurance policy and the transportation charges to the port of destination. Many foreign buyers prefer C. I. F. quotations, for it enables them to know what the goods will cost them on board of the ship at their ports.

Notwithstanding the fact that many Latin American buyers demand long time credits—in some cases up to six months or more—statistics show that the percentage of loss in foreign trade is very much less than the percentage in domestic trade.

The foreign freight forwarder acts as shipper for

the manufacturing exporter; he attends to shipping documents, places the shipments on the steamer and delivers them to the foreign ports.

Indirect Exporting relieves the manufacturer of all burdens peculiar to selling and shipping to foreign countries. Numerous export commission houses in all principal American ports offer valuable services. These houses have established branches in certain foreign markets and exploit the territory for their client's products.

However, the majority of paper manufacturers sell outright to paper export houses at domestic sales terms. Export orders from these houses, like those received direct from the foreign buyer, must be filled with utmost care. The customer invariably expects the goods equal to sample in every respect and if he does not find them up to standard, he not only will refrain from giving additional orders, but also might find recourse in lodging claims for large discounts or even reject the lot. A rejection in one of those remote parts of Latin America may mean a total loss to the shipper.

Instructions as to packing* and marking must be followed implicitly. Some Latin American countries base their tariffs on gross weights, therefore, cases must be as light as consistent with safe arrival. Extra handling, transhipments by animals, carts, llamas, native carriers or river boats are other factors to be taken into consideration. Cases must be made of closely joined boards and be lined with waterproof caselining, since the shipment may arrive during the rainy season or be exposed to the constant dampness of the tropical climate.

Export trade, with its many ramifications, is too broad a subject to be treated conclusively within the limited space of an article. Manufacturers contemplating entering the export trade on a large scale should secure the service of an export manager who is not only a linguist but also knows trade customs and conditions of export markets as well. Small mills with a limited export business through paper export houses will experience very little difficulty in handling export orders by strictly adhering to instructions given by those houses.

In exporting, like in domestic business, only repeat business counts and initial orders should therefore be given utmost care so that the customer will order again. We must give him exactly what he wants and not assume that anything not good enough for the domestic customer will be all right for the foreign buyer. We must treat the foreign buyer right and render him the best possible service. Business relations with him will then be pleasant as well as profitable and lasting.

* See THE PAPER INDUSTRY of February, 1922, page 1518.

The Power System

The Boiler Plant

By JOHN F. FERGUSON
Ferguson Engineers, Chicago

PERHAPS there is no part of the paper mill on which there is so much dependent as the boiler plant. Whether same is called upon to furnish only heat and steam for process and heating of building, or for a combination of process work, heating of building, and power for a part of the system or for the entire plant, it is usually found that no part of the plant is so much neglected in general operation, maintenance and over-all efficiency. These over-all plant efficiencies from coal to heat absorbed ranging from less than 50 percent found in many of the smaller plants up; many of the larger plants where we should be finding comparatively good results will be found operating at slightly better than 50 percent.

The question comes up—what may be called good over-all boiler plant efficiency?

With the latest developments in boiler plant installations, we should be expecting an over-all continuous performance well over 80 percent. With the so-called modern plant or the class being installed in most cases at present or during the past five years or so, we should be getting a continuous over-all performance of not less than 72 percent, while with the smaller and older class of installations, hand fired furnaces, we should be getting around 62 to 65 percent.

If you are not getting these results here mentioned, it is because your plant is not being maintained in good order for the class to which it belongs, or it is not receiving the proper operating attention, or the class of equipment and design of the plant in general are such that the results cannot be reached without some alterations or the remodeling of same, or the plant is burning an extremely poor grade of fuel. The first three items, either singly or in combination, in nearly all cases account for the low, over-all efficiency of the plant.

In many cases with the older installations, there is no record kept of the performance of the plant, in fact there has been no installation of any class of instruments for determining results, while in many of the later installations a neat set of measuring instruments are installed with the view of checking up the efficiency of the plant or at least to make it appear that the plant is modern and up to a high standard of operating efficiency. The fact that such

a complete set of measuring and recording instruments of every class desired is installed means nothing except that they represent an investment, for unless they are kept in accurate condition as to be relied upon, and observations and an analysis made regularly of the figures shown, to determine the working conditions, they will be useless and in the way.

The writer recollects inspecting a large boiler plant of a paper mill which boasted of their high standard of efficiencies. It had been operating only a few years and had what was considered at that time an excellent line of boiler room indicating and recording instruments, and not one instrument was in working order, nor had it been for some time. When a check was made of the results of the plant, the over-all efficiency ranged around 53 percent.

Does it pay to install indicating and recording instruments? It most assuredly does pay, provided that judgment has been used in selecting the type and class of instruments which indicate or assist in checking up the every day performance and working conditions of the plant. What may be the most important instruments in one plant may not be the most important in another. This will depend upon such conditions as the service of the plant, the type of equipment, and the class of operators. The most important instruments in general cases are: a flue gas analysis outfit; draft gages; thermometers for gas and water temperatures; fuel weighers; water meters or weighers. The less important ones such as steam flow meters, draft or damper regulators, recording steam gages, automatic water regulators, etc., should also find a profitable location in the larger plants.

It is not always necessary to run a series of tests in a boiler plant to determine whether the plant is operating efficiently or not; this can be seen by an expert in this particular line, in many cases by only the outside appearance of the plant, and after taking a glance at the inside appearance and operating conditions, he can in nearly all cases immediately tell whether the plant is operating efficiently or not.

What is most amusing, is to hear a manager speak of his plant being up to the last word in regard to equipment and operation, and at the same time large avoidable heat losses can be seen, without entering the plant, to say nothing of the many losses occuring on the inside.

In many of the newer plants, some of the losses which make their appearance on the outside of the older type of mills are diverted down the sewer and escape unnoticed to an outsider unless a closer inspection is made.

The losses in the boiler plant occur in a great many ways, such as: reckless purchasing of fuel; improper selection of fuel; loss in storage of fuel by fires, etc.; loss in handling of fuel; loss of fuel through grates or in ash; poor combustion due to insufficient or an excess of air, insufficient combustion space, improper control of drafts and regulation of fuel supply, and improper designed stokers, grates and furnaces; poor transfer of heat to the water due to dirty heating surfaces inside or outside or both, poor water circulation in boilers, improper baffling of the gases in the gas passage and broken down baffles, resulting in high exit gas temperatures; large infiltration of cold air into the gas passages due to improper fitting of furnace doors, manhole door, rear doors, open brick work, and improper fittin of brick work and setting next to the boiler surface; radiation losses from brick work and hot boiler surfaces; loss in heat in hot gases from boiler to stack; steam or hot water leaks in piping, valves, overflow of heater tanks, etc.

While each of these losses may be very small in itself and as scarcely any of them can be entirely eliminated, yet the total of all of them is found to amount to a considerable factor at the best.

In the extreme bad cases where many of them or all of them are great, one can imagine where the total losses run to.

All these items are governed or controlled to a great extent by the operating staff and the organization, while they are also governed to no less an extent by the right selection of equipment, such as the type and size of the boiler units, type of stokers and furnaces, type and efficiency of boiler plant auxiliaries.

Boilers

As to the type and size of boilers to select, this will depend upon the total capacity and varying load factor over a day, week or season. Large units will be more economical in fuel and labor than small units for an equal capacity and equal boiler rating.

The number of boilers (in almost any case) to secure the maximum efficiency, the minimum floor space and the minimum first cost, and yet allow sufficient reserve capacity, should not exceed the following: for a plant on which the demand does not exceed 50,000 pounds per hour, three boilers, one being for reserve; for plants with steam demand from 50,000 to 100,000 pounds, four boilers, one being for reserve; and plants with steam demand of from 100,000 pounds to 400,000 pounds, six boilers, one or two being for reserve. This last range will cover our very largest paper mills.

Boilers may be set in battery of sizes up to 750 boiler horsepower each, while above this size it is preferable to set them single.

In the case of plants being extended from time to time, it is very difficult to keep within the best practice on account of the smaller units being installed on the initial installation.

The horizontal tubular can no longer be considered a power boiler as it is limited in capacity and pressures, the 200 H. P. size being about the limit and working pressure not exceeding 160 pounds per sq. in. Beyond this size would not be good practice to install unless lower pressure is adopted, and this would be out of the question for power service, as the tendency

is for higher pressures. The horizontal tubular boiler serves very well for heating plants only where units of small capacity are desired.

Inasmuch as we have decided on a water tube boiler of some capacity, let us consider some of the advantages desired. The working condition will depend somewhat upon the power plant requirement, but to consider anything less than 200 pounds is nothing short of a crime, regardless of whether the power plant can use this pressure or not. The slight additional cost for a boiler of this pressure over one built for 150 pounds is very small when we consider the advantages gained, longer life of boiler and greater possibilities in development.

The diameter of the tubes also has a great bearing on the economical selection of pressure. Perhaps no one item has contributed so much to the hold up of efficient power development in the paper industry as the improper selection in this line.

The writer would perhaps (except in very few cases) recommend boilers designed for 265 pounds as a minimum for power service so as to be able to take advantage of the opportunities in efficiencies that are almost sure to be available at some later date, if not at the time of installation.

The paper industry is due for some surprises in the near future on the possibilities along this line. In a very short time we will see boilers upwards of 400 pound pressure in operation. The advantages gained along this line will be gone into more in detail in some later articles.

Superheater

Boilers for power service when equipped with a superheater should be selected and designed for the proper location of superheater unit or units in the gas passage permitting access to same for repairs and inspection. The extent of superheat of steam required can only be decided upon by a proper investigation of each case, such as type of power units, transmission distance of steam, and other factors.

Economizer

The economizer as a part of the boiler plant perhaps brings up more questions as to its adaption and economical advantages than any other piece of boiler plant equipment. The economizer as has been used in the past with one installation serving several boiler units, is fast disappearing in new up-to-date installations, and economizers of special dimensions installed in series with single boilers or integral steel economizer built as a part of the boiler unit, have many advantages over this older class of installation.

Stokers and Fuel

The stoker governs to a great extent the total capacity and the efficiency of the complete boiler unit; in fact in the majority of cases, the stoker capacity is reached long before maximum boiler capacity, also the drop in efficiency of the boiler unit is due much more to the drop in efficiency of the stoker rather than in the boiler. Perhaps more mistakes in boiler plant construction are made in the selection of the stokers than in any other part of the plant. Boilers are so often and perhaps in 90 percent of the cases understokered, that is, too small a stoker for the boiler. This is due either to lack of knowledge or information along this line or to the competition among stoker manufacturers in which the salesman is compelled to bid on a smaller stoker in order to beat out his competitor on price. The buyer falls for it and discovers his mistake later on or else gets the idea that the stoker is not what it is cracked up to be in either capacity or efficiency.

If the boiler is understokered, we will find our best or most efficient operating condition at a comparatively low rating of the boiler capacity, and if the boiler is overstokered we will find our most efficient operating pint at a much greater boiler capacity than with the understokered plant. Therefore, it lies as much with the stoker as with the boiler or perhaps more so in determining the most efficient rating to operate the separate boiler units. Again, a boiler properly stokered for a good grade of fuel will perhaps be understokered with a poor grade of fuel; this, of course, would be reasonable to expect. The grade of fuel to be used should have a considerable bearing on the selection of a stoker. The two general types of stokers of the present day are the traveling grate and the retort underfeed. For fuels having a very high ash value, whether bituminous, Anthracite, Lignite or non-coking, a traveling grate type will generally be found to have the greater advantages. Most of our western fuels come under this class. If fuel is of the coking class with low ash value, such as most of our eastern coal, the underfeed single and multiple retort will be found more satisfactory and economical. There are many varieties of coal that can be satisfactorily burned with either type of stoker, and the stoker will be decided on by many other factors in connection with operating conditions, etc.

Another class of stoker known as the inclined gravity feed class require, for best operation, fuel either low in ash, or an ash having a high fusing temperature, or both.

The overfeed class of stoker will find its best field in burning low volatile and non-coking fuels with ash of low percentage and high fusing temperature.

The underfeed single and multiple retort types demand a forced draft for operation. The chain grate or traveling grate type has until recently been operated with a natural stack draft or mechanical induced draft, while today we are also able to secure this type of stoker designed for forced draft.

The inclined, gravity feed type is used almost entirely with the natural stack draft, with mechanical induced draft applied in some cases where economizers are installed, while the overfeed type is generally considered a natural draft stoker, yet can be adapted to forced draft and induced draft operation.

Connecticut Valley Superintendents Organized

SUCCESS beyond all expectations marked the formation of the Connecticut Valley branch of the American Pulp and Paper Mill Superintendents Association at the Hotel Nonotuck, Holyoke, Mass., on November 18. Much credit was given to Edward T. A. Coughlin who spent two days in advance of the convention in work for the new branch, and to local men including Chairman John J. White of the Whitmore Manufacturing Company, James A. Reilly of the American Writing Paper Company, and Burt Kent of the Papermakers Chemical Company, by President John H. O'Connell of the National Association and other speakers.

Mayor Welcomes Superintendents

Many of the mill men arrived the night before. The registration kept James W. Spicer of the American Writing Paper Company and two women assistants busy for over an hour. About 10:30 A. M., the men, numbering about 70, assembled in the ballroom of the hotel where they were called to order by Frank L. Barstow of Fitchburg, Mass., who introduced Mayor John F. Cronin who gave an address of welcome in behalf of the city. Mayor Cronin not only extended a cordial welcome to the visitors but said that the city felt honored by their presence and that he hoped they would come again. He then outlined some of the strong points of the municipality including the steam railroad to Westfield that was built by Holyoke when it was a small city, the waterworks which furnish water to the citizens at about the lowest rate in the United States and the gas and electric department (municipally owned), which gave low rates on gas and electricity to all.

Mayor Cronin also extended a hearty invitation to the National Association to hold its next meeting in that city. "I want you to all feel," he said, "that Holyoke is not only ready to welcome you but we want you to gain such an impression of the city that you will be glad to see us again." He closed by extending his best wishes for the success of the new organization.

Homer E. Stafford of Watertown, N. Y., responded briefly but fittingly to the mayor's address, after which Edward T. A. Coughlin, technical director for the Allied Paper Mills of Kalamazoo, Mich., gave an address on the aims and work of the association, prefacing his address with congratulations for the big turnout. He said he was at a loss for words to express the feeling of satisfaction at the attendance which eclipsed all expectations. He paid a tribute to James A. Reilly, Burt Kent, and John J. White for their assistance in canvassing the field. After his address there came the election of officers; the balloting resulted as follows: Chairman, John J. White of the Whitmore Mfg. Company of Holyoke; first vice chairman, J. E. Madore, superintendent of the Crocker Division of the American Writing Paper Company; second vice chairman, George Hancock, superintendent of the Robert Gair Company of New London, Conn.; third vice chairman, T. F. Rogan, superintendent of the Fitchburg Paper Company of Fitchburg, Mass.; treasurer, John J. Kennedy, superintendent of the Crocker McElwain Company of Holyoke; secretary, Burt Kent of the Papermakers Chemical Company of Holyoke.

President O'Connell Talks

A social hour followed the election and a buffet lunch was served in the small ballroom. President John H. O'Connell, who is still limping badly from injuries received while making a tour of inspection of the mills of New York State spoke feelingly of the early history of the association and how it had grown from the small group that started when Fred C. Boyce was president to its present membership of over 500. "At these annual conventions that are held from year to year, opportunity is given to swap experiences," Mr. O'Connell said, "to find how the other fellow did it—to obtain mutual benefits. The printers are demanding better and different papers and you must be prepared to meet that demand. The rotary printing press is increasing in its demands on your skill and ingenuity for papers that will serve. This getting together to listen to papers by experts is most helpful. The time has gone by when one had to climb into the back window of a mill to find what was newest and best in the scheme of operation to find what the other fellow had.

"We have our cost associations and our technical associations, but in my opinion the superintendents' is the most valuable of all. They have to come to you, finally; for though the cost man may show you what it costs to make this or that paper, and the technical man what should or should not go into the paper, it is up to you superintendents to make the paper. It is therefore important that you all listen to these experts who have studied and worked to get up these papers to teach us things that we may not know. Ask questions—ask many of them rather than go away ignorant.

"By becoming members of this association you become allied with 500 men engaged in the same line in this great industry."

There were four papers read at the afternoon meeting. The first was given by Robert B. Wolf, of the R. B. Wolf Company, of New York City on "Mill Management Problems," which is published elsewhere in this issue.

The Problems of Paper Curling Discussed

H. H. Hackett of the Eastern Manufacturing Company of South Brower, Maine, followed with a technical paper on "The Curling of Paper." Mr. Hackett said, that a few years ago the curling of paper was little thought of. The printers today demand a high speed product, one that will lie flat on the press. The problem of preventing the curling has not been thoroughly mastered but a start has been made and a study of printing shop operations has given a cue to the secret. The curling of paper is met with mostly in winter time. At such times the temperature of the printing shop is generally high and the humidity low. The paper curls up on the edges and leads to poor impressions.

Mr. Hackett also quoted the effect of static conditions due to electricity from friction due to the dry air. If the moisture leaves one side of the paper more than the other, the dryer side becomes the shorter and a concave surface is formed leading to curling. Most of the paper is shipped with 6 or 7% of moisture and the paper loses its moisture in the high temperature faster on one side than on the other, leading to curling.

The fact that in no one process of papermaking could the trouble be located as it ran through all the various processes, the effects of the sizing, the drying, the fact that the wire side was different in texture than the felt side and thereby absorbed a different content of size, were discussed in detail. To overcome all tendency to curling seemed impossible, but it was possible by taking pains in all the processes and securing an even finish on both sides to avoid some of the trouble.

The next paper was by J. A. Reilly, of the Cost Department of the American Writing Paper Company, on "Co-ordination of Expense Items in Preparing Departmental Budgets." Mr. Reilly's paper is printed elsewhere in this issue.

The closing paper was by J. H. Kurlander, of the Edison Lamp Works of Harrison, N. J., on "The Economics of Lighting in Paper and Pulp Mills." Mr. Kurlander illustrated his paper with stereopticon slides and outlined the principles that must govern economical lighting arrangement and equipment and showed slides illustrating both good and bad lighting effects.

The session closed with a banquet at which Chairman John J. White of the Whitmore Manufacturing Company of Holyoke was toastmaster. Between this banquet and the last paper, automobile parties were formed for the purpose of visiting various paper mills and other plants about the city. The speeches at the banquet were all of an informal nature, Chairman White calling from those present from time to time to say a few words.

Those attending the convention included A. B. Jackson of St. Louis; James Bartley of Holyoke; U. M. Benzing of Canton, N. C.; V. S. Denison of Schenectady, N. Y.; J. Allen of Ashuelot, N. H.; B. L. Alper of Providence, R. I.; A. T. Boivelt of Manchester, Conn.; F. F. Barstow of Fitchburg, Mass.; Charles Beebe of New York City; J. F. Calbert of Fitchburg, Mass.; Charles Champion of Adams, Mass.; William Croft of Turners Falls, Mass.; Edward T. A. Coughlin of Kalamazoo, Mich.; W. B. Clemens of Holyoke; Ross Campbell of Cincinnati; George Docherty of Holyoke; W. F. Dewey of Housatonic, Mass.; William Dalrymple of Windsor, Conn.; Arthur A. C. Drew of New Bedford, Mass.; Edward Dricoll of Lee, Mass.; David M. Dewey of Belview, N. Y.; Edward

Docherty of Holyoke; Max Fehringer of New York; F. E. Field of Hinsdale, N. H.; W. A. Gram of Brooklyn; Charles Guenther of Boston; E. W. Gibbons of Lee, Mass.; H. H. Hackett of South Brewer, Me.; George H. Hancock of New London, Conn.; R. O. Harper of Housatonic, Mass.; Charles D. Higgins of Bellows Falls, Vt.; H. H. Hooden of Stoneham, Mass.; Joseph Hodgins of New York; J. H. Hayer of Skaneateles, N. Y.; Arthur Hewan of New York; John J. Holland of New York; John Johnston of Holyoke; Bert Kent of Holyoke; G. H. Kurlander of Harrison, N. J.; John J. Kennedy of Holyoke; John Seishman of Windsor, Conn.; Arthur Lowe of Erie, Penn.; R. B. Livermore of West Groton, Mass.; B. Larrabie of Cumberland, Me.; H. W. Nash of Hamilton, O.; H. Montville of Middletown, O.; J. E. Madore of Holyoke; William McKay of Holyoke; R. W. McCorkindale of Holyoke; E. K. Mansfield of New London, Conn.; H. W. Mendrum of Holyoke; F. J. Mooney and C. N. Mooney of Lee, Mass.; H. F. Obermann of Erie, Penn.; J. H. O'Connell of The Diana Paper Company, president of the national association; John J. O'Brien and L. D. Post of New York; H. C. Parsons of Turners Falls, Mass.; C. W. Quinn of New York; H. W. Reynolds of Passaic, N. J.; Edward Rex of Holyoke; Thomas F. Rogan of Fitchburg, Mass.; L. J. Robertson of Bellows Falls, Mass.; George Raynor of Montville, Conn.; George Stephens of Hinsdale, N. H.; Charles C. Stewart of North Wilbraham, Mass.; H. E. Stafford of Watertown, N. Y.; A. A. Tanyane of New York; R. M. Watts of Springfield, Mass.; R. J. Wainwright of Vancouver, B. C.; Forbes Wood of Bridgeport, Conn.; J. A. Reilly of Holyoke; C. E. Weed of Hinsdale, N. H.; Scott Williams and Adam Wilkinson of Holyoke.

New York Superintendents Meet at Watertown

Fully 100 superintendents and others connected with the paper industry gathered at Watertown November 15 for the semi-annual meeting of the Northern New York Division of the American Pulp and Paper Mill Superintendents' Association meeting, presided over by Homer A. Stafford, superintendent of the Knowlton Brothers mill in Watertown. During the day the superintendents visited the Deferiet and Herrings plants of the St. Regis Paper Company, and late in the afternoon returned to Watertown, where they visited the factory of the Bagley & Sewall Company, one of the best known manufacturers of paper machines in the world.

At the afternoon session, called to order at the Hotel Woodruff about 4 o'clock by President Stafford, papers were read by Perry D. Taylor of Carthage on "Paper Making in China;" by Harold Bing of the Sandusky Foundry & Machinery Company on "The Revolving Suction Roll;" by A. W. Nason of the Green Bay Foundry & Machinery Company on the "Save-All;" by Carl C. Schneider, chemist at the Knowlton mill, on "Loading and Filling Materials for Paper," and by Joseph A. Quinlan, traffic manager of the St. Regis Paper Company, on "Packing Paper for Shipment." The last four papers are published elsewhere in this issue.

A dinner was held in the grill of the Woodruff at 6:30, followed by addresses by Rev. Hubert S. Wood, pastor of St. Paul's church, and John H. O'Connell, national president of the association. At this meeting honorary membership was bestowed on Frank A. Fletcher of Watertown, 82 years old, who retired from active work in paper mills in 1912, after a career that extended from the age of 12 and that took him up and down the entire Atlantic seaboard. He came to Watertown in 1874 to manage the mills of Knowlton Brothers, which he converted to the making of high grade paper.

The paper read by Mr. Taylor was of keen interest to the superintendents, relating as it did in detail to methods of paper making so different from the highly specialized systems used in their own mills.

Family Mills Numerous in China

"Family mills still exist by the thousands in China," said Mr. Taylor, who only a short time ago returned from a business trip to that country. "In the province of Kiangsi alone, which I visited, there were 300 such mills. The first process in Chinese paper making is to crush the bamboo, which is then placed in trenches, layer for layer with unslacked lime. It remains in the trenches for three or four weeks or perhaps as many months, after which it is separated into three classes—white, cream and wrapping paper pulp—and is placed in separate bins.

"The beating into fibers is done in stone vats, sometimes by men with a stone pestle, and at other times by means of a kollergang. The pulp stock is screened through bamboo woven screens by hand. For coarse papers the operator dips his hand into the vat and brings up an unmeasured amount. For the better grades a mould holding a certain amount is placed on the bottom of the vat, and is shaken until a sheet is well formed. The sheets are then removed and placed on dryers like inverted Vs, with smoke stacks at one end and a furnace at the other.

"I presume I had some of the most unusual stock ever used to work with in making a batch of paper in China last June. It consisted of some old money issued by the imperial government, and of course useless under the republic. There were ten tael notes to the value in American money of $500,000; large dollar notes worth $932,500; smaller dollar notes worth $3,000,000; $10 notes worth $396,000; $5 notes valued at $530,000; $10,000 notes worth $770,000,000; $5,000 notes worth $1,050,000,000; $1,000 large notes worth $1,622,258,000; small $1,000 notes worth $2,241,100,000, and $200 notes worth $73,023,400.

"One of the principal papers made in China is joss paper, the word 'Joss' meaning 'God.' This is burned at death beds, sick beds, and on holidays and celebrations. There are two kinds, one coated with silver and the other with gold. American and British paper makers have tried in vain to imitate the paper, for which the principal requirements are a white ash and white smoke.

"Raw materials for the Chinese industry are at present low, but crops now being raised will replenish the supply. Bamboo, rags, sea grass and mulberry tree bark are most used. There are in China eight paper mills with modern machinery, containing altogether 13 machines. These mills are situated at Fisanfu, Fchen Kai Ki, Wuchang, Soochow, Shanghai, Hongkong and Canton."

Plea For Good Will

Rev. Mr. Wood, at the evening meeting, made a plea for the exercise of good will by both employee and employer in the paper trade. From personal experiences he related the difference in the atmosphere in paper mill towns having kind and civicly minded owners and in those where the owners were devoid of reason in the treatment of their men.

"I believe it should be thoroughly understood that this association is not a union," declared Mr. O'Connell. The superintendents' president, because of an injured leg, spoke from his chair.

"Some manufacturers fail to realize the benefits that can come to their superintendents from membership in the association," continued Mr. O'Connell. "The paper industry is the seventh largest industry in the country, and I consider the superintendents the most useful factor in the industry. Technical men are an important part of a mill's organization, but I do not believe they can ever displace the practical superintendent."

Corwin T. Jewell, assistant general manager of the St. Regis Paper Company, urged greater participation in the discussions by those attending meetings.

List of Those Attending

J. H. O'Connell, Diana Paper Company; W. J. Argy, St. Regis Paper Company; Carl McGram, St. Regis Paper Company; P. D. Taylor, Carthage; W. E. Blauvelt, Cameron Truck Company, Brooklyn; Charles McIntyre, Phoenix, N. Y.; J. J. McLean, Sherman Paper Company; Washburn Weston, American Wringer Company, Woonsocket, R. I.; C. T. Jewell, St. Regis Paper Company; Paul D. Luce, Boston Woven Hose & Rubber Company, Cambridge, Mass.; John L. Nolan, Diana Paper Company; Martin Nolan, Diana Paper Company; M. J. Cornell, St. Regis Paper Company; John W. Zeliph, Utica Mutual Insurance Company; E. L. Outterson, Carthage Sulphite Pulp & Paper Company; H. E. Rockwood, Champion Paper Company; C. W. Hayes, Carthage; G. R. Huggins, Industrial Extension Institute, N. Y.; Fred J. Rooney, The Upson Company, Lockport, N. Y.; P. H. Moran, Carthage Sulphite Pulp & Paper Company; Leo W. Bowker, St. Regis Paper Company; Thomas H. Ireland, Crane Company, New York; C. A. Parsons, St. Regis Paper Company; C. A. Lura, St. Regis Paper Company; Carl C. Schneider, Knowlton Brothers; D. N. Giddings, Crane Company, Syracuse; James Rice, W. C. Stebbins Supply Company; H. E. Newcomb, St. Regis Paper Company; R. J. Wainwright Canadian Robert Dollar Company, N. Y. C.; F. W. Roberts, F. W. Roberts Manufacturing Company, Lockport, N. Y.; Thomas R. Riley, Watertown; W. J. Livingston, Dexter Sulphite Pulp & Paper Company; J. E. O'Connell, Dexter Sulphite Pulp & Paper Company; S. R. Turner, Harmon Paper Company; Theodore Safford, Racquette River Paper Company; Thomas Holt, Racquette River Paper Company; W. N. Karls, St. Regis Paper Company; C. C. Stewart, Newton Falls Paper Company; T. L. Dunbar, Stebbins Engineering & Manufacturing Company; J. J. Grieb, Ryther & Pringle, Carthage; G. H. Spencer, S. K. F. Industries, Inc.,

N. Y. C.; Kenneth Gallinger, Taggart Brothers Company; W. G. Lewis, Knowlton Brothers; C. R. Gibbs, Ryther & Pringle Company, Carthage; M. J. Maguire, Empire Size & Chemical Corporation, Albany; E. W. Krom, Sweet Brothers Paper Manufacturing Company, Inc., Phoenix, N. Y.; R. A. Webb, Albia Box & Paper Company, Troy, N. Y.; C. E. Dawley, National Paper Products Company, Carthage; N. Rigabar, National Paper Products Company, Carthage; H. L. Scherrer, Mumford Paper Mills, Inc., Mumford, N. Y.; H. J. Cadwell, North Counties Coal & Supply Company; F. P. Wadley, St. Regis Paper Company; P. J. Baron, St. Regis Paper Company; J. R. VanAmber, North Counties Coal & Supply Company; J. A. Quinlan, St. Regis Paper Company; C. T. Wright, Champion Paper Company, Carthage; William Robertson, Empire Size & Chemical Corporation, Albany; C. L. Klages, Knowlton Brothers; Harold Bing, Sandusky Foundry & Machine Company, Sandusky, O.; C. H. Plantz, St. Regis Paper Company; George McL. Gilbert of Carthage; Homer M. Rice of the E. I. Dupont de Nemours Company; Edward S. Lansing and Harry C. Kinne of the Bagley & Sewall Company; Homer A. Stafford of Knowlton Brothers; Rev. Hubert S. Wood, and M. E. Avery of the M. E. Avery Company.

Cost Association Convenes at Holyoke

The convention held by the Cost Association of the Paper Industry at the Nonotuck Hotel, Holyoke, Mass., on Thursday, Friday and Saturday, November 9, 10 and 11 was a decided success.

The proceedings were opened by a report from the secretary-treasurer, Thos. J. Burke, which report is printed elsewhere in this issue.

Election of officers for the forthcoming year then took place and the following were elected:

President, C. A. Jasperson, Secretary, Nekoosa-Edwards Paper Co., Port Edwards, Wis.; Fist Vice-President, Dr. R. E. Rindfusz, Secretary, American Writing Paper Co., Holyoke, Mass.; Second Vice-President, John C. Schmidt, President, Schmidt & Ault Paper Co., York, Pa.; Third Vice-President, W. W. Sunderland, President and Treasurer, Miami Paper Co., West Carrollton, Ohio; Fourth Vice-President, E. J. Fitzgerald, Office Manager, Scott Paper Co. and Chester Paper Co., Chester, Pa.

Executive Committee

President, C. A. Jasperson; First Vice-President, Dr. R. E. Rindfusz; Col. B. A. Franklin, Strathmore Paper Co., Mittineague, Mass.; S. L. Bush, Manager of Research, Crocker-McElwain Co. and Chemical Paper Mfg. Co., Holyoke, Mass.; J. E. Hyde, S. D. Warren Co., Cumberland Mills, Me.; Dr. Hugh P. Baker, Executive Secretary, American Paper & Pulp Association (ex-officia); Thos. J. Burke, Secretary-Treasurer, Cost Association of the Paper Industry (ex-officio).

After the election of officers, ex-president Bush made a splendid address on "The Cost Accountant—His Past, Present and Future Place in the Pulp and Paper Industry." Mr. Bush, who is manager of research of the Crocker-McElwain Co. and Chemical Paper Mfg. Co., has filled the presidency of the Cost Association for the past two years and during this period has given unstintedly of his time in assisting the association's work. He was mainly responsible for the drawing up of the publication "A Budget Cost System for Paper Mills" which was published last year by the association, several hundred copies of which have been sold to cost men in the industry in addition to being distributed to the members of the association. The address given by Mr. Bush is printed elsewhere in this issue.

Reports were also made by the chairmen of the Cost Committees appointed to represent the different groups in the industry.

Afternoon and Evening Session

The afternoon session on Thursday was taken up by the address by Mr. J. A. Reilly, Manager Cost and Inventory Department, American Writing Paper Co. on the subject of "A Standard Basis for Comparative Cost Estimates." Mr. Reilly submitted photostat copies of a standard cost estimate and a chart showing distribution of all expense items and determination of departmental rates. He went carefully through the standard cost estimate, item by item, explaining the different items and how they should be compiled. The whole session was taken up with his address and the discussion which followed it and it was decided to make several adjustments in the estimate.

A very successful banquet and dance was held in the evening when the following films were shown:

"Thirsty Fiber"—Scott Paper Co.

"Safety Picnic"—Nekoosa-Edwards Paper Co.

"Making Paper"—Writing Paper Manufacturers' Assn.

Addresses were also made by Col. B. A. Franklin, vice-president of the Strathmore Paper Co. and E. H. Naylor, secretary-treasurer Writing, Cover, Book and Tissue Paper Manufacturers' Associations. The former spoke on the subject "Men Make Systems—Systems Cannot Make Men," and the latter on "The Executive and the Cost Accountant." Both speakers stressed the necessity for hard work on the part of the cost accountant, the former referred to the struggle he had had in his early days to draw up a cost system without the necessary co-operation when he had had to guess at his figures because there was no other way to get them. Amongst other things he stated that "Unquestionably a constant study of cost work is at the basis of proper progress of cost system work if we are going to make the progress that we want to." Mr. Naylor stated that he would prefer not to hear the term "cost clerk," preferring that of "cost executive" which he claimed every cost man should be if he were properly carrying out his duties. Mr. Naylor stressed the fact that cost men should mix a little salesmanship in their work in order that they might sell themselves properly to their executives as well as to the other departmental heads.

Friday Morning

Friday morning very interesting addresses were given by Harold Dudley Greeley, C. P. A. Treasurer, National Association of Cost Accountants, who spoke on "The Use of Ratio Charts in Business," and C. A. Ware, A. C. A. Assistant Secretary, New Print Service Bureau, whose subject was "The Value of Comparative Costs." The principle feature of Mr. Greeley's address was the advocation of logarithmic charts instead of linear charts in the presentation of figures, in order to show their proper relation to each other. Logarithmic charts are so ruled that the distances between the lines instead of representing actual differences represent proportionate differences. For instance, on a linear chart, the space between lines drawn to represent the dollar level and the ten thousand dollar level would be the same as the difference between lines representing the ten thousand dollar and the twenty thousand dollar level, whereas on a logarithmic chart the space between lines representing the thousand dollar and ten thousand dollar levels would be the same as the difference between lines representing the ten thousand and hundred thousand dollar levels, since one thousand bears the same proportion or ratio to ten thousand that ten thousand bears to a hundred thousand. Mr. Greeley presented a number of interesting charts showing very clearly that by using logarithmic, or as he called them "ratio charts" facts and figures were presented in a manner to show their direct relation to each other. The Cost Association expects to publish his address in the near future as soon as photostat copies have been prepared of some of Mr. Greeley's charts.

Mr. Ware in his address illustrated very clearly the fact that comparative costs have been of great assistance to the newsprint manufacturers in assisting them to improve their manufacturing efficiency. He pointed out that owing to the peculiar nature of the manufacturing processes involved in paper making there is a great deal of room for such improvement and that the comparison of conversion costs was undoubtedly the best method of assisting manufacturers to do this.

Friday Afternoon

The afternoon of Friday was given up to "Round Table Group Conferences." In the Writing and Cover, Tissue, and Wrapping groups standard cost estimate forms were decided on and will be issued shortly to those mills which have agreed to send in their costs to the association. The chairmen of these different group committees explained carefully that these comparative conversion costs will be compiled on a standard basis along the lines suggested by Mr. Reilly, i. e., by using the specifications as stated in the proposal forms used by the Joint Committee on Printing appointed by the United States Government. The various trade association secretaries will be requested to decide which specifications shall be selected so that when compiled the statistics may prove of the greatest usefulness to the greatest number. In this connection it should be clearly understood the chief object of compiling these figures is to compare the costs for the purpose of assisting the mills to improve their manufacturing methods by showing them where their costs are high as compared with other mills making the same product or with other mills who are in a position to make the same product. The whole afternoon was devoted to these group meetings and in each case it was decided to go ahead immediately after the

forms are ready and collect figures relating to conversion costs.

The new president of the Cost Association, Mr. C. A. Jasperson, is the first president from the West. He is very well known to the members of the Cost Association, since he has been a regular attendant at their meetings and has on several occasions made addresses on different subjects. He is also president of the Wisconsin Local Division of the Association which has been active ever since it was established some years ago and has been extremely useful in spreading the gospel of cost accounting amongst the mills of that state. Mr. Jasperson is extremely enthusiastic about the work of the Cost Association and anxious that it shall grow in membership during his term as president and requests that all mills interested in proper cost keeping should immediately consider the advisability of joining the Association, thereby doing their share toward placing the industry on a sound economic basis.

Saturday morning was given up to visiting the Chemical Paper Company and the American Writing Paper mills in Holyoke after which those attending returned to their respective mills feeling that this convention was one of the best yet held by the Cost Association.

Board Division of Superintendents Organized

The initial meeting of the Board Division of the American Pulp and Paper Mill Superintendents Association was held at the Congress Hotel, Chicago, November 25.

This meeting did not start off with a flare and a big noise, like so many other "flash in the pan" propositions have. A true pioneer spirit of earnestness to build well the foundation pervaded every session of the meeting. It can never be said of this newly formed organization that its future was all spent in its initial meeting. Their start was not a grand one—no more grandeur about it than about the soil-clad laborer who digs the trench wherein the foundation is to be laid.

After waiting some time for P. J. Massey, who was to have made the morning address but was not able to attend until later, the meeting was called to order by Ed Coughlin, at 11:40. Mr. Coughlin, in his address of welcome, reviewed a few of the fundamental policies that have caused the Superintendents' Association to develop and spread so rapidly. The keynote of the association, according to Mr. Coughlin, is to give and take information. Subordinated to this one big purpose is social fellowship. He also pointed out that the work of the association, being a national organization, had a tendency to broaden a superintendent and help him to avoid becoming provincial in his ways of thinking and doing things.

Mr. Coughlin also mentioned the superintendents' question box—a place for an interchange of ideas, the solving of problems and the learning of better methods and processes. The members of the organization were invited to mail any puzzling problems to the secretary. "In place of trade secrets," he said, "there is now a spirit of good fellowship among the superintendents." It was also emphasized in Mr. Coughlin's talk that the Superintendents' Association is not a union.

Officers Elected

The nomination committee, appointed by Mr. Coughlin, was composed of Mr. Peterson, Mr. Claud Nicely and Mr. Wilson. After a deliberation of forty minutes the following men were recommended, by this committee, for officers of the new organization: Claud E. Nicely, chairman; Lee Wilson, first vice chairman; Henry Burt, second vice chairman; T. L. Peterson, third vice chairman; Daniel J. Gallery, secretary and treasurer, and Bernard Benson, J. P. Furlong, R. F. Knott and A. McPhillips were recommended for the advisory committee. The report of the nominating committee was accepted unanimously without a change.

While the nomination committee was preparing its recommendations, Mr. Coughlin asked for short talks from various superintendents. Mr. Burt, who claimed the honor of being the only charter member of the Superintendents' Association present, said this initial meeting of the board division reminded him of the first meeting held by the superintendents, up in Appleton, Wis., several years ago. "The attendance at that first meeting was small," he said, "but it has grown and a great deal of good has come out of our meetings. I have gained a great deal of personal good from them. They have helped me to make better board, also in other ways. But to get the good out of this association you've got to attend the meetings in person. You can't get the most by reading about it."

Mr. Chas. W. Shartle in a little impromptu talk brought out a point worthy of mention. He said, "The best thing in business is to get acquainted. The knowledge you gain from this association is important and so is the opportunity afforded you to associate with other men in the same business you are."

Paper Makers Should Not Be Hermits

Mr. Nicely said that the paper maker, of all men, should not make a hermit of himself. To illustrate his point he took for example the first paper maker—the wasp. "The wasp," he said, "is a bug with close social relations with his fellow bugs." At the close of his talk, Mr. Nicely expressed his desire to be of service to the new division in any way possible. As an indication of his sincerity in expressing this desire he offered to underwrite the expenses of the division for a year, when a few minutes later the question of expenses was brought up. His offer was accepted upon vote of a motion by himself.

After a few minutes of discussion of some new developments which Mr. Burt had seen on a machine in Battle Creek, the morning session adjourned to the French Room where a satisfying buffet luncheon was served.

Before the regular program of the afternoon commenced the question of future meetings was discussed. It was finally decided that the next meeting should be held the second Saturday in February.

Educational Talks Mark Afternoon Session

The first speaker in the afternoon was Sidney D. Wells, engineer in Forest Products at the Forest Products Laboratory, Madison, Wis. He gave a very interesting talk on the Influence of Moisture on Tests of Container Board. His talk is printed elsewhere in this issue.

Chemical Control in the Board Mill was next discussed by K. I. Herman, president of the K. I. Herman Chemical Corporation, Chicago. Mr. Herman said that his subject would be more clearly stated were it "*Technical* Control in the Board Mill." He brought forth in a very interesting and concise manner the fact that a well trained chemist is a decided asset to any mill. By discovering the purity of all incoming products the company would be enabled to buy more wisely thereby realizing a definite cash return on the chemist. Mr. Herman was very emphatic, however, that the chemist should not run the mill. "The superintendent should hire the chemist and use him merely as a tool to discover various hidden quantities in the shipments of raw materials received. The discoveries of a good chemist will enable you to lower your costs." In conclusion, Mr. Herman once more emphasized the fact that the man to run the mill was the practical superintendent.

The last speaker on the program of the afternoon was Mr. Chas. W. Shartle, president of the Shartle Brothers Machine Co., Middletown, Ohio. Aside from the substance of Mr. Shartle's talk, which is printed elsewhere in this issue, he showed a number of lantern slides illustrating beaters of various types.

The afternoon session adjourned at four o'clock and the superintendents were taken to the plant of the Chicago Mill and Lumber Company where they were shown numerous processes and tricks of the trade.

Massey Addresses Banquet

The chairman of the newly formed organization, Claud E. Nicely, was toastmaster at the banquet that closed the first meeting of the Board Division of the American Pulp and Paper Mill Superintendents' Association. The banquet was served in the Rose Room at the Congress Hotel and made a very fitting close for the work of the day. It left, in many respects, a good taste in a score and a half of mouths as the meeting gave back to as many localities its various members.

The principal speaker of the evening was P. J. Massey, National Treasurer of the Superintendents' Association, who was to have talked in the morning. In reviewing the success and rapid growth of the superintendents' association he said, "The superintendents' association was organized because there was a need for such an organization, and since it filled a need it was certain to grow." Mr. Massey also said that now, after the organization of the board men, the next move was to form a similar organization of newsprint men. It was his contention also that the value and the keynote of the entire Superintendents' Association was an interchange of ideas and discoveries.

Following his address, toasts were given by Bernard Benson, B. Franklin, R. F. Knott, Henry Burt, Ed Coughlin, F. E. Kerr and L. D. Post. The burden of these toasts was an expression of willingness to be of service to the new organization.

List of Those Registered

B. W. Bennett, Fulerton, N. Y.; W. H. Burns, Appleton, Wis.; Henry Burt, Downing Box Co., Milwaukee, Wis.; Oliver Buswell, Chicago; J. P. Carter, J. G. Cherry Co., Tama, Iowa;

Ed Coughlin, Allied Paper Mills, Klamazoo, Mich.; G. A. Dowd, Beloit, Wis.; W. F. Ebbing, Cincinnati, Ohio; A. E. Emerson, Chicago; Frank Eilers, Kalamazoo, Mich.; J. P. Furlong, Ruberoid Co., Joliet, Ill.; Daniel J. Gallery, Chicago Mill & Lumber Co., Chicago; J. W. Harbrecht, Hinde & Dauch Paper Co., Sandusky, Ohio; Joe Hodgins, New York City; R. F. Knott, Crescent Paper Co., Marseilles, Ill.; F. E. Kerr, American Strawboard Co., Noblesville, Ind.; Herbert Lippett, International Paper Co., New York City; M. Middleton, Box Board Magazine, Chicago; A. McPhillips, Beloit, Wis.; G. A. Olson, Chicago; T. L. Peterson, Mount Vernon Strawboard Co., Mount Vernon, Ind.; L. D. Post, New York City; J. W. Richardson, Crescent Paper Co., Marseilles, Ill.; Chas. W. Shartle, Middletown, Ohio; H. K. Vinton, Chicago; Sidney D. Wells, Madison, Wis.; Lee Wilson, Morris Paper Mills, Morris, Ill.; Bernard Benson, Williams-Gray Co., Chicago; W. A. Yule, Albany, N. Y.; Claud E. Nicely, La Salle Paper Co., South Bend, Ind.

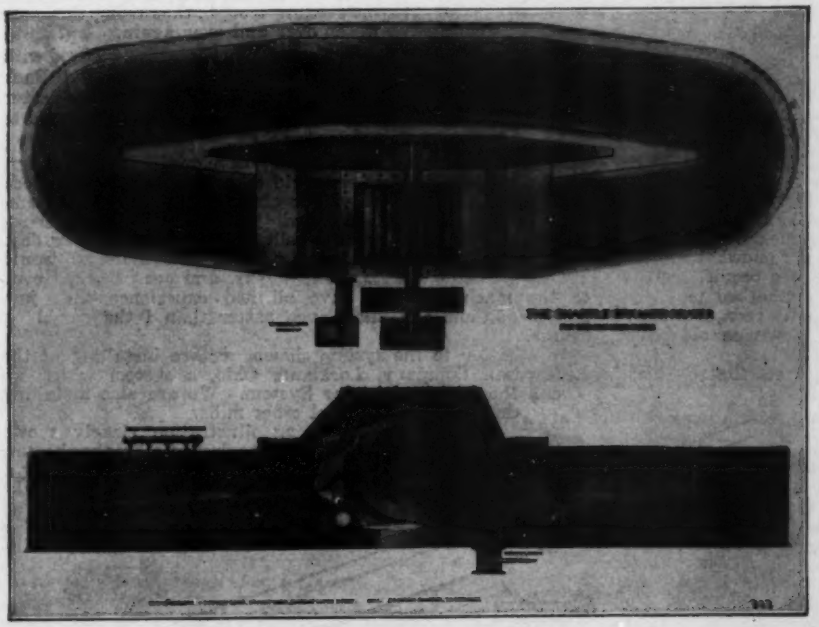
Association Papers

Beaters*

By CHARLES W. SHARTLE
The Shartle Brothers Machine Co.

PERHAPS this subject really should be Beater instead of Beaters for it has been my experience that I have had about all that I could do in the past thirty years to learn about just one type of beater, this being a beater or a development of the beater for handling mixed papers. You are all manufacturers of board, and consequently your interest lies along the line of a beater or beaters which will satisfactorily handle your stock and it is my intention to spend most of my time on this phase of the beater question.

However, it may be of interest to you as paper makers to know something of the various types of beaters which have been used in the past and some of which are being used today. Doubtless, most of you are familiar with most of those types.



I have had some lantern slides made showing several types of beaters.

First, I wish to show the picture of an old time mill. This mill was owned by my Great Grandfather and was located just outside of Linlithgo, Scotland.

An old Uncle of mine used to tell me a story about a Bridge or Culvert that covered the mill race to this mill. This bridge was known as Kerry Brig.

This bridge was built by the Romans along about the 13th century and to the best of my knowledge is still standing. About 500 years after this bridge, or Kerry Brig as it is known in Linlithgo, was built, a man who had lived there for many years and had gone away for about five years returned and as he was walking about with an old crony they came to this old Kerry Brig, he stopped and in a surprised manner said: "Oh Kerry Brig are ye standin' yet?"

It is a standing joke in Linlithgo for every one who passes Kerry Brig to say, "Oh Kerry Brig are ye standin' yet?"

Just a few years ago I met a Scotchman in Cincinnati who made brass work. He asked me if I could get him a piece of jacket to use for polishing and I asked him how he knew about jacket and he told me he had worked in a paper mill in Linlithgo, Scotland, and I said: "Oh Kerry Brig are ye standin' yet?" You should have seen how surprised he looked. It developed he was my Mother's Cousin.

I don't know much about that mill except that the paper was made by hand and a great Uncle told me that the beaters were three plungers working in a vat. They were made of wood with iron bands and cams on a shaft would raise them and they dropped of their own weight upon the bottom of the tub which was made of a large stone. The stock was circulated with a paddle, so I suppose this is where the name of Beater originated.

There was a beater made along about 1880 which I do not think many of you ever saw or heard about. It was the Gould. I could not find a picture of it. This beater was made in the shape of a pear. The large part was about 8 feet in diameter and was set vertically, the small end down. The shaft was vertical and on it was fastened a disc about 3 feet in diameter which carried the fly bars and the bed plate was fastened to the tub. It was driven by a pair of bevel mortise gears and the shaft was adjusted vertically. I saw one running on rope stock and the stock was fairly churned and got very hot. This beater was not a success—only a few were installed and to my knowledge none are in use today.

Additional types of beaters which have been used and some of which are now used are the Standard Hollander, Umpherson, Patent, Horne, Patent Emerson, Taylor, Rabus, and Niagara.

You are all more or less familiar with these beaters excepting possibly the Taylor. I have never seen one of these but am under the impression that they were used in England. In this beater the roll is at the top and about one-half of the tub sets below the floor line. The stock passes under the roll down into the tub and is returned to the roll by a centrifugal pump. I leave it to you to judge how this would work on New York dump stock.

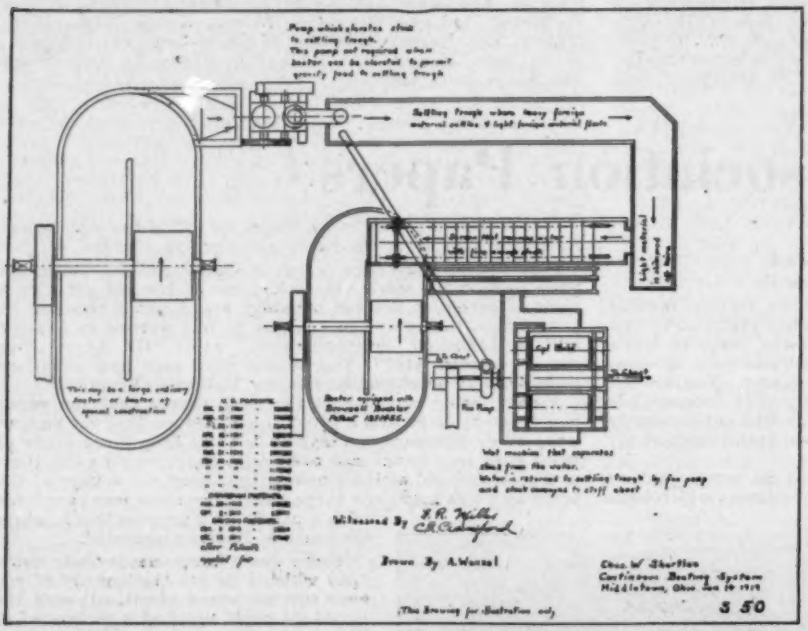
The original Hollander is so well known to all of you that it is not necessary for me to show a picture of it.

It is not my intention to speak in a disparaging manner of any beater, but I have lived long enough and seen enough of beating to know that the old fashioned Hollander is here to stay, at least it has weathered all the storms of new types of beaters to date.

However, I am of the opinion that there is too little consideration given to the type of beater purchased for a particular purpose. For instance, suppose John Brown wants to build a mill to make roofing felt—he needs say six 1,500 pound beaters—he goes to see the firm building them—they show him a lot going through the shop for A. G. Wightman who is building a mill to make writing papers out of rags, and then Jake Parent calls for some beaters to make board and he is shown the same beaters, and these same beaters are sold for any and all kinds of stock. Now, that is just where the machine man has made his mistake, because I believe most of the beaters which I have shown have their place.

*Paper read before the organization meeting of the Chicago Board Division of the American Pulp and Paper Mill Superintendents' Association on November 25, 1922, at the Congress Hotel, Chicago.

The builder should study the conditions under which the beater is going to operate and take into consideration the kind of paper the mill is going to make and prescribe a certain beater for that purpose. It has been my life study to build up a beater for board only. All this is of interest in only a general way.



Original Shartle System, showing two beaters, settling trough, screens and wet machine

Most of you have been of the opinion that the method and the beaters which you have been using in handling old paper stock are wrong. However, most of you men have at some time made fine papers and naturally it is somewhat difficult to get away from the idea that mixed papers require beating in the sense that the roll be set down on the bed plate. In the past few years this practice has generally been abandoned until today very few mills set the roll down on old paper stock.

I know of one board mill which always set the roll down until about four years ago. This mill had four beaters on the filler. They were always having to make adjustments due to a poor sheet, but the superintendent insisted on keeping the roll down hard until they broke a shaft on one beater and for some reason or other on this day they did not have sufficient power to set the rolls down. This left them running on three beaters, none of which had the roll down. They made a sheet so much better that they have never fixed the old broken beater and never again set the roll down.

This brings out just one point and that is that with old mixed papers the process should be one of disintegration rather than one of drawing out the fibres. There has been another factor in making you seek some other method for reducing mixed papers, and that is the large amount of foreign material which is in the stock. This has been the source of trouble all through the mill. It has also run up labor costs, for you have attempted to remove this foreign material by hand and have not been successful.

The Breaker Idea

Now, some years ago I was standing beside a beater which was being charged with old paper stock for boxboard and when the beater was finally filled I picked out a handful of the stock and realized that at least 75 per cent of the stock was beaten or disintegrated sufficiently so that it was ready for the Jordan. This idea brought about the development of the system here shown. This system consisted of charging one beater which we called a breaker, continuously; the side of the beater was cut out and overflowed into a sump out of which it was pumped by an 18 or 24 inch single plunger pump to a setting trough. These pumps were designed especially for this purpose.

We experimented with several types of troughs and riffle boards but finally came to using a plain trough about 24 inches deep and 48 inches wide and 50 feet long. Today we make this trough guided by our experience according to the tonnage required.

As soon as the stock from the breaker was pumped to the settling trough, the consistency was reduced by the addition of sufficient volume of water so as to cause the metals and heavy materials to settle and the wood and cork to float, same being removed by a skimmer. It took considerable experimenting before we found the proper amount of water to add.

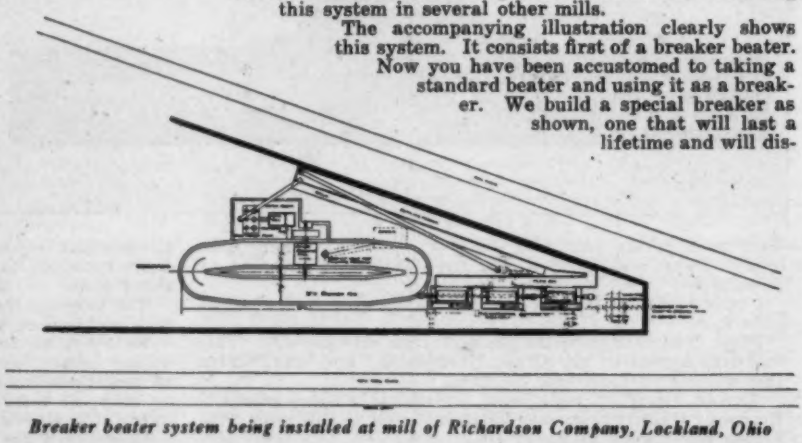
The point that comes to your mind here is that we require a large volume of additional water. This is not true, as you will see in a moment. The stock passes from the trough to a screen. This screen is equipped with scrapers. The scrapers carry the coarse stuff over the screen into a secondary beater. The stock which has been disintegrated sufficiently passes through the screen into a decker which consists of a cylinder mold and coucher, the purpose being to remove the excess water and return it to the settling trough, thus using the same water over and over again.

The secondary beater is equipped with a Brownell Buehler Perforated Back fall, the stock passing out of this beater automatically when properly reduced to the beater chest.

Now, this method of handling developed several things, among which were that we could take New York dump stock and remove automatically all foreign materials. This is exemplified by the illustration showing the foreign materials removed in one week from a mill making 50 tons per day. Without this system a large part of this material would have gone on to the Jordans, pumps, and oven worked over to the machine. You have all had experience with just such conditions and know even better than I the trouble it causes.

In addition to the system shown, we are installing at the Richardson Company, Lockland, Ohio, a system which we call the Shartle Breaker System. We are also installing this system in several other mills.

The accompanying illustration clearly shows this system. It consists first of a breaker beater. Now you have been accustomed to taking a standard beater and using it as a breaker. We build a special breaker as shown, one that will last a lifetime and will disintegrate more mixed papers than a half dozen ordinary breakers.



Breaker beater system being installed at mill of Richardson Company, Lockland, Ohio

These breakers are built in all sizes up to a capacity of 400,000 pounds per 24 hours. We haven't made any larger than this to date, but I am perfectly safe in saying we can build one for 800,000 pounds per 24 hours if we have a call for it.

In building this breaker we disregarded present standards and built with just one point in view—that of successfully handling mixed papers at the lowest possible cost. The tub in this breaker is of concrete and varies in length from 40

feet to 75 feet according to the tonnage required and space available.

As a general rule the top of the tub is set about one foot above floor line. This enables the stock to be trucked in, the wires cut and the entire bale pushed in the breaker at once. There is absolutely no danger to the breaker in doing this as it is built for just such service. The roll has a steel shaft which is only carried to the hollow midfeather—thus permitting the backfall to be raised to a height assuring a rapid circulation of the stock.

The roll carries bars 1 inch by 12 inches, each bar being held in place by an individual ring about 8 inches in diameter. The bars are spaced on 12 inch centers. There is no adjustment to the roll, it being mounted in specially designed trunnion type bearings which are carried on heavy coil springs thus taking up any shocks. There is no bed plate furnished and the rolls set off the bottom from 6 to 8 inches.

The back fall is of the Brownell Buehler type, the face being drilled with proper size holes permitting the stock to automatically pass through when sufficiently disintegrated. Due to the centrifugal force from the roll, these holes will not plug up. The flow stock from the backfall is controlled by a head box. The breaker can be provided with a string catcher if desired. The fact that this breaker is so large enables it to be run for a week or more without cleaning, depending upon the nature of the stock. The large volume of stock in the breaker also insures a more even mixture and gets the stock in shape so that less work is required of the Jordans.

After the stock passes through the backfall and is cleaned in the settling trough, it passes to the decker or thickener and from there to the chest.

The main difference in this system is that we use a perforated backfall in the breaker and do away with the screens.

Now, we claim that the Shartle system does three things: First—we automatically remove all foreign material from the stock. This does away with cleaning out stock chests, vats, tearing out Jordans, stops pumps from plugging and makes a better, stronger sheet.

I cannot overemphasize the importance of the cleaning of the stock. It means so much more than is generally realized. Illustrating this point, Mr. Jack Brookover of the Frank P. Miller Paper Co., East Downington, Pa., has written us concerning the Shartle system in his mill.

The new mill of this company was built in 1917. Due to lack of coal they were down part of this year but later ran continuously until 1920. At this time they refilled their Jordans for the first time and the second filling is still in the Jordans. Of course, part of this may be due to the fact that they use Miami Jordans.

The large machine in this mill is a six cylinder, 136 inch machine and the largest stock pump used is an 8x18 Duplex. Mr. Brookover states that he is enabled to use this small pump for the reason that the Shartle system thoroughly cleans the stock and his pumps never plug and are always working at full capacity. Second—we claim a saving in labor. This is due to the fact that we set our breaker close to the point of supply as possible, thus reducing the trucking to a minimum. We further save in labor as all the filler stock is handled at one point and instead of attempting to remove foreign material by hand, it is all done by machinery.

Owing to the fact that the breaker is set approximately at floor level, no lifting is required to furnish the breaker, in fact the entire bale is fed into the breaker at one time.

Sunday clean ups are avoided, and further savings in labor are effected through less repairs to equipment. As an additional point, labor is always better satisfied.

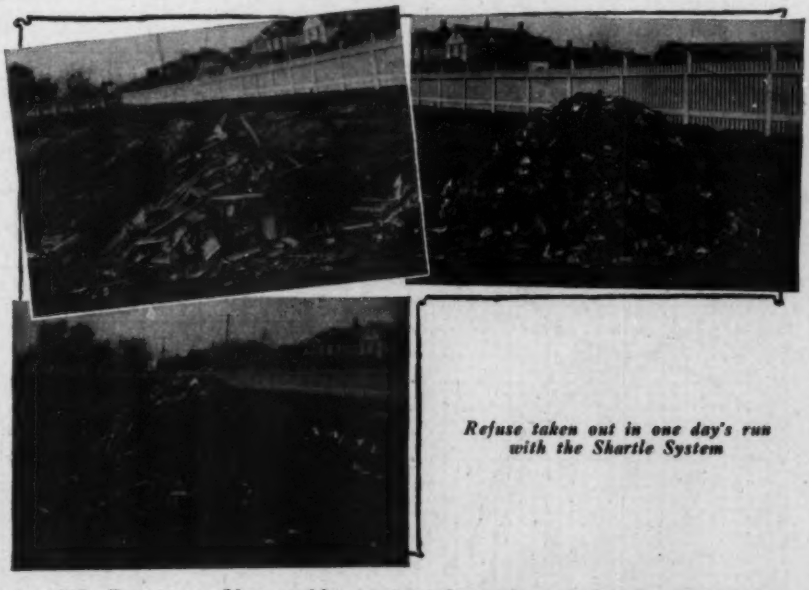
Illustrating this: Mr. Parent, superintendent of the Western Board and Paper Co., Kalamazoo, Mich., states that where he formerly could not keep men on his beater gang, he can't get rid of them since installing the Shartle Breaker system. "We also claim a saving in power. Unfortunately, we do not have at the present time any motor driven installations which are in operation. We have three systems being installed, all of which will be motor driven. As soon as these are placed in operation we will have definite power figures. However, we can say that to date we have not installed a system where a material saving in power has not been effected."

Now, I probably could talk for several hours on the proper way of handling mixed papers; however, what you want is results. You demand that I show you that I can and have done the things I claim.

Following is a letter which I received a few months ago from Mr. W. E. Smith of the Bogota Paper and Board Co., Bogota, N. J. We did not ask Mr. Smith for this letter and consequently it is worth considerable more than if we had.

The Shartle Brothers Machine Company,
Middletown, Ohio.
Gentlemen:

We wish to advise you that we have started up the Breaker beater and we are highly pleased with the operation of the same. It has not given us a bit of trouble from the very start. Everything went off in splendid shape. We presume Mr. Morrison has reported to you, as he was out here and saw the operation of it. You certainly have done a great service to the paper board manufacturing interests in putting this beater on the market. No mill making paper board can afford to be without it.



Refuse taken out in one day's run with the Shartle System

If we could not get another one, no one has money enough to buy this one so long as we want to operate our mill. So that you will see the high opinion we have of this machine.

BOGOTA PAPER AND BOARD CO.

As I stated before I can go on talking indefinitely on this subject—this letter, however, probably carries my point stronger than anything I can say. I, therefore, wish to state that I will be only too glad to answer, to the best of my ability, any question you may ask.

Your problems are the problems which I as a builder of paper mill machinery desire to solve and it may be of interest to you to know that we are constantly working towards improved methods and equipment in the board mill. I would welcome your criticism as I believe that I can successfully answer any objections which you may have.

Influence of Moisture on Tests of Container Board*

By SIDNEY D. WELLS

Engineer in Forest Products, Forest Products Laboratory, Madison, Wis.

THE growth in the consumption of fiber board is probably most phenomenal of any major product of the paper industry. We have constantly brought to our attention the inroads of the newspaper into our forests but compared with fiber board the growth of the consumption of newsprint

*Paper read before the organization meeting of the Chicago Board Division of the American Pulp and Paper Mill Superintendents' Association on November 25, 1922, at the Congress Hotel, Chicago.

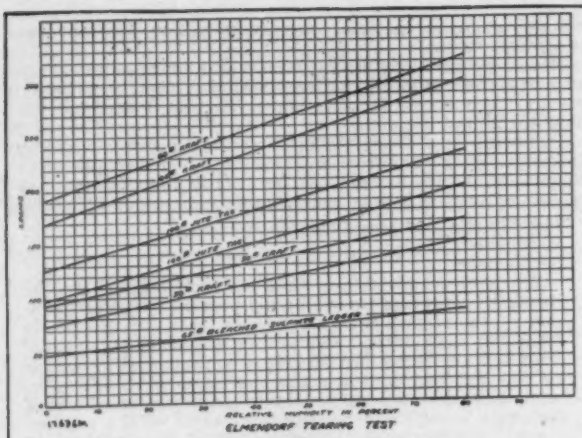


Fig*7

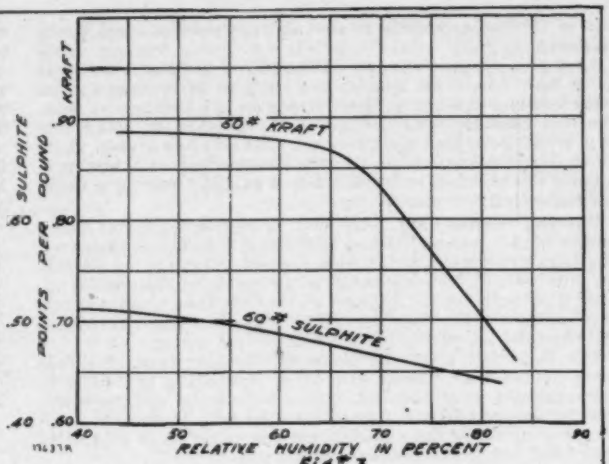


Fig*3

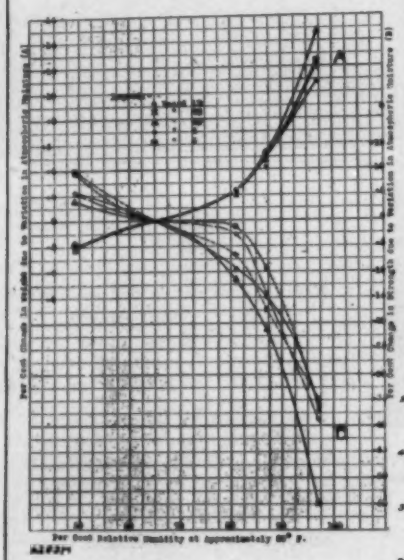


Fig*1

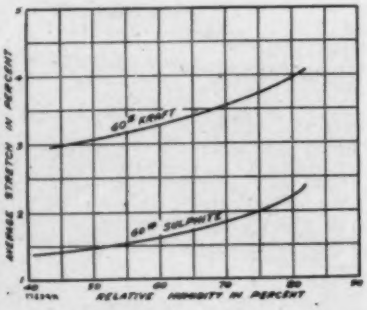


Fig*8

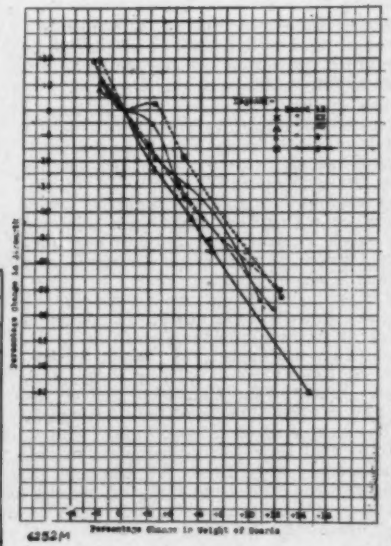


Fig*2

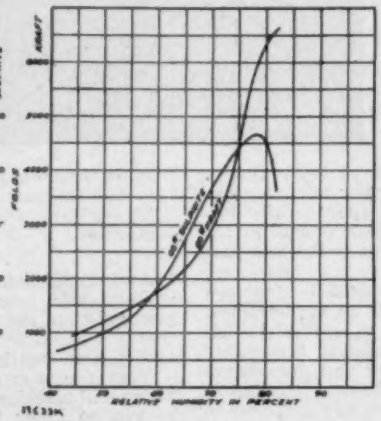


Fig*6

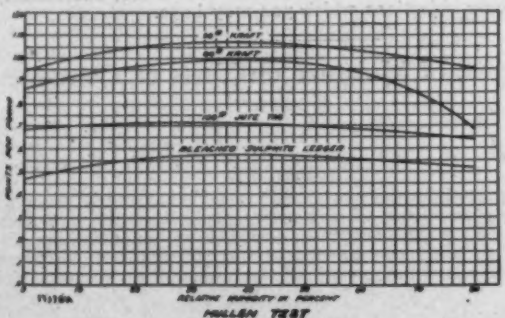


Fig*4

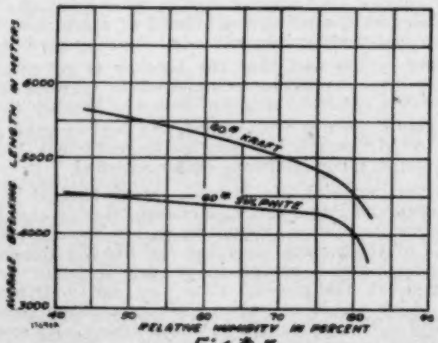


Fig*5

is slow, as is shown by an average increase of 9 per cent per year during the last twenty-three years for the former against 5 per cent annually during the last seventeen years for the latter. Between the years of 1899 and 1920 the reported tonnage increased from 366,000 tons per year to 2,313,000. The amount actually used for fiber containers has increased from something like one-eighth of a million tons in 1907 to around one and one-third million tons in 1920. In terms of total box consumption, including both fiber and wooden boxes, it represents a growth in round numbers of from ten per cent to sixty per cent of the total. This growth does not represent a tax on the forests, however, but a saving of what would otherwise have been wasted. It is our concern not only from the standpoint of conservation but from the purely mercenary motive of personal income that the growth of the use of fiber containers continues to increase and the main factor determining that is to deliver the service expected. There was a period of several years, some ten or more years ago, when the hostility to the fiber box was very keen and it would undoubtedly have been legislated out by the railroads if the fiber box associations had not met the issue by backing the efforts to formulate and maintain standards. Standards, however, are a matter of slow growth, and we occasionally come upon instances where they are not comprehensive enough on one hand or specific enough on the other.

The influence of humidity or moisture is a factor of vital importance and while we all will acknowledge such an influence we usually pay no heed to it when making or testing paper board and even in cases of dispute it is often not considered. For this reason I may be justified in bringing to your attention some of the work at the Forest Products Laboratory which bears on the subject. Some of this work has already been published in an article by Kress and Silverstein in the Journal of Industrial and Engineering Chemistry, March, 1917, and one by Kress and McNaughton in Paper, May 27, 1918. Some of this work was on paper but on account of the difficulty of testing board in such machines as are commonly used for folding and tearing tests on paper, they are also included. The influence of humidity is the same, however, and general conclusions will apply to both.

Both board and paper show a considerable variation in bursting strength as indicated by the Mullen Test. Figure 1, curves A, shows the influence of moisture on the weight of some typical boards and curves B the influence of humidity on strength. They all indicate that after 80 per cent humidity is exceeded the pop test rapidly falls off. Such humidities are not uncommon in unheated warehouses, freight cars, or store rooms and would explain how excellent board may sometimes be rejected and at the same time inferior board pass if fortunate in the surroundings in which it was tested. Figure 2 shows the relation of strength to change in weight or moisture in the boards. The straightness of the curves would indicate the change in pop test to be directly proportional to the change in moisture content of the board. Figures 3 and 4 show the effect of humidity on papers made from typical stocks which find their way into board manufacture. The pop test increased as the paper leaves the oven dry state until it reached a maximum relative humidity of 40 per cent. From there until a relative humidity of 65 or 70 per cent was reached the drop was slow but after that point in the case of many kraft or sulphite papers it rapidly increased in amount.

Figure 5 shows how tensile strength as shown by the Schopper Tester of paper is affected by humidity. The effect is shown to be similar to the effect on bursting strength. On the Schopper we also obtain the stretch of the paper under breaking strain and that is seen to act quite differently from bursting and tensile strength and increase with increasing relative humidities.

Figure 6 shows how humidity affects the folding properties of paper as indicated on the Schopper folding instrument. Here again we note an increase with increasing humidities, very rapid in the case of kraft after a relative humidity of about 70 per cent reached. In sulphite after about 77 per cent was reached we note a drop which increased in degree and if a humidity of 85 per cent or greater had been reached the paper would have probably proven too sodden to give any test at all. These tests, however, indicate quantitatively what is well known to the paper maker in a general way and that is the flexibility of paper is benefited by coming to equilibrium in air of fairly high humidity.

Not only does the flexibility of paper increase with moisture but the toughness is also benefited as is shown by figure 7, showing the results obtained with the Elmendorf Tearing Tester. The upper curve of each pair is for tearing across the machine direction, the lower curve in the machine direction. In so far as the range observed we found a consistent increase in the tearing test as relative humidity was increased. In fact if a test made at any humidity was plotted and a straight line drawn through it and a point on the bottom line 100 per cent by scale to the left of the zero point it would give the tearing test at any other relative humidity within the limits of experimental error. The results express graphically what has been common observation as to the benefits derived by seasoning paper. While the pop test and tensile strength determinations give a measure of the rigidity and tensile strength of paper they give no indication of its brittleness, flexibility, or toughness. The latter are indicated more by the stretch, folding resistance, and resistance to tear and while the former are all increased as the air approaches the extreme dryness of the heated office the latter are favored by the more normal humidities of from 70 to 80 per cent. While sizing may slightly retard the time taken by paper to come to equilibrium it exerts no permanent effect so far as we know and the ultimate amount of moisture taken up is the same as for the unsized sheet. Coating with pitch or paraffine will retard the time necessary for equilibrium from the two or three hours required for a sheet hanging in the air to several days. The reuse of such board, however, is problematical and so far as we can see the humidity of the atmosphere will continue to exert its influence on the strength of board and paper products. Since it plays so large a factor we should recognize it by either testing under standard conditions or determining what the conditions are at the time of the test and interpolating.

Large Hand-Saw for Cutting Rolls

The hand-saw shown in the illustration is believed by those who have seen it to be the largest ever made.

This record-smashing hand-saw was recently made to specifications furnished Henry Disston & Sons, Inc., Philadelphia, the well-known makers of saws, tools and files.

The saw was made for a special purpose—to cut rolls of

paper wound on brass tubes. Many of these paper rolls are full 24 inches in diameter, while the brass tubes are generally 2 inches with 1/16 inch walls. The mighty sweep of this 48-inch hand-saw goes through the tight machine-rolled paper and brass tube with equal ease.

The saw stands the height of a small boy and the blade is about twice the size of any ordinary hand-saw blade.

An order for fifty thousand butter cartons to be printed in Spanish and shipped to the city of Panama was recently received by the Cedar Rapids Paper Box Company of Cedar Rapids, Iowa.

Costs and the Paper Industry*

By THOS. J. BURKE, C. A.

Secretary-Treasurer, Cost Association of the Paper Industry

HOLYOKE is really the birthplace of the Cost Association of the Paper Industry, for although its first convention as a separate association was held in Buffalo in December, 1918, the mills chiefly responsible for the interest taken in the cost movement are located in the district of which Holyoke is the center. It is, therefore, perhaps the more remarkable that this is the first occasion on which we have held a convention in Holyoke.

It is our eight convention, as you will see from the program, and it is the third held since I have been secretary-treasurer of the association.

Before proceeding further I want to say how much I regret the fact that our president, Mr. Bush, has stated definitely that having served two years as president he feels that it is time for somebody else to succeed him. I have very much enjoyed my association with Mr. Bush and want to say now I have fully appreciated the fact that it would have been very difficult for me to have carried on without his very great assistance and advice. Mr. Bush, of course, will remain a member of the executive committee, thus his advice will still be available and therefore our loss will not be as great as it might otherwise have been. I am sure you will all agree with me in expressing the hope that he will soon again enjoy his past good health.

Now, as to the association itself, I regret to inform you that it is not as flourishing as it might be. During the extreme depression which existed in the paper industry until the early part of this year, we lost members who were frank enough to state that the only reason they were resigning was because they wished to reduce their expenses in every possible way. After I had written these mills pointing out that the work which we were carrying on was necessarily slow, yet it was one which finally would undoubtedly assist in avoiding the big losses incurred during bad times, some of them withdrew their resignations, but still the net result was that our income has decreased about $1,000 per annum.

Larger Budget Needed

Frankly speaking, we have not sufficient funds to carry on our work satisfactorily. In my opinion we should have an annual budget of from $3,000 to $5,000 more to "carry on" to the best advantage and I am out to get this money, and with your co-operation, will get it. You are of course aware that the Cost Association as at present organized derives its income solely from dues paid by mills members of the organization at the rate of $100 per annum. We have no personal or other memberships. Some of our income has been lost through the amalgamation of two or more mills which had previously each been a member of this association but who, after they amalgamated, of course, only had one membership, thus our income was reduced by one or two hundred dollars per annum.

Now, the point is, what do our members get for the money which they pay to the association? These benefits can be arranged under three headings:

1. Benefits to the industry.
2. Benefits to the different groups in the industry.
3. Benefits to the cost men of the industry.

I will deal with these benefits in the order name.

Benefits to the Industry

From statements which have been carefully compiled, we know that practically without exception there is in every branch of the industry a surplus machine capacity, which can only spell one thing—keen competition. Keen competition necessitates carefully checked selling quotations in order to make sales. Now are all mills in each group of the industry carefully checking up their selling quotations today? You know, and I know, and they know, that they are not doing so. They may believe that they are, but they are not, and as long as there is just one mill in each group which persists in arriving at its selling quotations by means of rule of thumb methods, there will always be unfair competition. It is unnecessary for me to define "unfair competition;" both of them are good words of which we all know the meaning. If we as individuals were told that our methods were unfair we should resent it very much, and if we were fair minded and had any respect for the person making the statement, would do our utmost to find out the basis for the statement, and if we were satisfied that it was substantially correct, would take steps immediately to change from an unfair to a fair method.

Now if that is true of us as individuals, why should it not be true of us as executives of pulp or paper mills? Unless it is done in a very tactful and friendly manner it is not easy for one executive to tell another that his methods are unfair, but through the Cost Association he can very well bring to the attention not only of one executive, but of many executives of pulp and paper mills who are today practicing unfair methods of competition, the fact that they are doing so and suggest the steps they should take to improve their methods. I personally believe that in many cases such methods are used solely because their users are ignorant of the fact that there *are* better methods and either cannot, or will not, take the trouble to make a proper investigation to ascertain the truth. That is the great benefit that the Cost Association can render the pulp and paper industry, namely, it can place the whole industry on a sound economic basis by teaching executives the necessity for proper cost accounting and cost estimating.

During the past six months we have dispatched more than 4,000 letters, not only to our own members but to all members of associations affiliated with the American Paper and Pulp Association, on such subjects as "The Relation of Budgetary Control to Cost Accounting," "The Opportunity of the Cost Accountant to do Analytical Work for the Executive," "Uniform Accounting Systems Urged for Trade Associations," "Inventories," "Letter from Chairman of Federal Trade Commission on Price Cutting," "Cost Audits," "Normal Burden Rates," etc.

Now I know from the replies received, both from members and non-members, to those different circular letters, that they are very widely read and have in some cases been instrumental in inciting members to take up this cost question in their own trade associations.

That naturally leads me to a discussion of the second heading, namely, "Benefits to the Different Groups within the Industry;" but before dealing with that point, I want to say a few words relative to the American Paper and Pulp Association.

There are fifteen trade associations affiliated with the American Paper and Pulp Association and there are four service associations, and in addition the Woodlands Section of the American Paper and Pulp Association. The four service associations are the Superintendents', Cost, Salesmen's and Technical Associations. Early this year a plea was drawn up by the Finance Committee of the American Paper and Pulp Association for rearranging the methods of financing the Association and for improving its internal organization. It is not necessary for me to go into this plan very fully at this time. It is sufficient to state that it contemplated the collection of dues on the basis of the value of the yearly production in each group in the industry. The following arbitrary value was fixed on the different products:

Suggested Plan for Financing the Association

Binders' Board, $60 a ton; Board, $40 a ton; Book, $120 a ton; Cover, $294 a ton; Glassine and Greaseproof, $240 a ton; Pulp, $60 a ton; Tissue, $188 a ton; Vegetable Parchment, $240 a ton; Wrapping, $100 a ton, and last but by no means the least important, Writing, $314 a ton.

Based on these values the total value of the yearly production in all groups amounted to $269,000,000, taking 300 days to the year on what was estimated to be a normal daily production. Now then, if the Cost Association is to have a large enough budget and could collect its dues in this manner, it would have to collect the following amounts on each ton of product:

Binder's Board	⅛ of a cent
Board	⅛ of a cent
Book	⅜ of a cent
Cover	1⅛ cents
Glassine and Greaseproof	1¼ cents
Pulp	⅛ of a cent
Tissue	1 cent
Vegetable Parchment	1¼ cents
Wrapping	⅛ cent
Writing	1⅜ cents

It should be noted that in no instance does the amount to be collected exceed 1⅜ cents per ton of production, this being payable by the Writing Paper manufacturers.

Now, gentlemen, unfortunately, the scheme was not put through, at any rate as regards the Service Associations, and just what will happen to it, I don't know. The figures quoted, however, clearly indicate at what a small cost this Association can render a service of great usefulness to pulp and paper manufacturers, namely, by keeping up a continuous propaganda for the adoption of proper cost finding and cost estimating methods in the industry.

That is the basis on which the News Print Service Bureau collects its dues. They collect about four or five cents a ton on a product, which in most cases is worth considerably less

*Address given at Cost Convention held at Nonotuck Hotel, Holyoke, Mass., November 9th, 1922.

than the above mentioned products. Now, Mr. Ware will tell us tomorrow morning something about the value of comparative costs as this has been demonstrated by the News Print Service Bureau, of which he is Assistant Secretary. They spend yearly on their cost work alone at least twice as much as this Association's total income. That is to say, one branch of the industry with perhaps the easiest manufacturing process spends twice as much as the whole of the other branches put together.

Now, as an Assistant Secretary of the American Paper and Pulp Association, as well as Secretary of the Cost Association, I make the statement that in my opinion the American Paper and Pulp Association would only be acting in the best interests of the industry if it went definitely and unequivocally on record to the effect that it believes that the installation of proper accounting methods and the collection of comparative conversion costs to be absolutely essential to the industry's continued prosperity. I will go further than this and say that in my belief A. P. and P. A. should, for its own sake, see to it that our work does not languish for lack of funds, this because it is difficult to estimate the value of this work to the industry on a dollar and cents basis.

Consider the case of those mills without adequate cost departments. They are unfair competitors because their selling prices are based on guesswork; at any time when through our activities, even *one* of these mills is induced to install an adequate cost system the other mills in that group, who already have them, can feel a little safer from unfair attacks and when all the mills in a group have been brought into line it is no exaggeration to say that the saving to those manufacturers through the elimination of "selling below cost" will amount to many thousands of dollars.

The A. P. and P. A. has done a splendid work in the last few years by its campaign for reforestation. I believe it will be able to do *twice* as much, or three or four times as much in the next few years if it will first "put over" a similar campaign for cost education because a successful campaign of this kind would mean a saving of hundreds of thousands of dollars to the industry which would allow of larger appropriations for continuing the forestry campaign. Let me again cite the News Print Service Bureau as an example in this connection. Proper reforestation probably means more to the Newsprint group than to any other group in the industry, yet the Newsprint men have not hesitated for some years to devote a considerable portion of the income of their Bureau to educating its members in correct cost finding and cost estimating methods.

Benefits to the Different Groups in the Industry

Now, for the second point as to the benefits which this Association can render to the different groups in the industry. As planned at our last Convention, we have appointed cost committees and for the sake of convenience have arranged the following groups: Writing and Cover, Tissue and Toilet Paper Converters, Book, Wrapping, and shall be pleased to add other groups as sufficient interest is shown therein. The members of these different committees, owing to the fact that they are somewhat scattered, have not been able to confer together as often as they would wish, and another reason why their work has been delayed is because it takes so long to get replies from many mills, so that it was several months before I had collected sufficient data to submit to the members of these committees.

I am convinced that a great deal of useful work, in fact that a complete cost system, can be designed by the men in the industry, but sacrifices will have to be made and a lot of time and thought given to the subject by cost men themselves.

This "group service" naturally brings me into closer relation with the Secretaries of the different trade associations affiliated with the A. P. and P. A. and I want to take this opportunity of saying how very much I appreciate the co-operation I have always received from Mr. Naylor, whom you all know. I regret to say that in one or two cases I received no co-operation whatever. I have done my utmost to reach these secretaries but without success, so I have had to go ahead on my own initiative. I want to assure these secretaries that in no way do I wish to undermine the confidence which their members have in them. My policy is to do my duty as I see it to the industry and if they will co-operate with me I shall be glad to the best of my ability to assist them in the difficult work of making their members "see the light" regarding this important cost question.

Now, I want here to appeal to each cost man present in this manner. Will you make it a point when you leave this Convention, not only to make a report as was suggested at our last Convention, on the work done here to your executive, particularly of course regarding any pointers which you might have received during the convention which will help you to improve your work or your Department; but ask him if he will not help you to the extent of joining this Association? I think as regards cost accountants, we might reverse a well known saying by stating that they are made, not born. Of course one might have certain qualities, such as perseverance, tactfulness, etc., about which we have been told very often, but cost accountants in the pulp and paper industry have so many difficult problems to deal with that it is essential they should receive every assistance possible, and this can best be given through a central organization like the Cost Association.

Benefits to the Individual Cost Man

This leads me to a discussion of the third point mentioned above, namely, "Benefits to the Individual Cost Man." During the past few months, I am glad to say that the invitation which I made at Kalamazoo to cost men to write more often regarding their individual difficulties has been acted upon and we have in a number of cases been able to be of service to cost men connected with mills members of this Association. We have also rendered service to cost men outside our organization and in this connection I would like to ask these men to put it up to their executives as a serious proposition that they should pay their share of the upkeep of the Association.

You know there are a number of very fine cost men connected with this industry and they have one and all, at some time or other, expressed their willingness to do anything they could to help the Cost Association in its work. They are heart and soul with us, but unfortunately there are other cost men who do not appear to take that interest in their work which all of them should exhibit if they are to prove that the Cost Department is an absolute necessity which cannot be dispensed with in any mill. Possibly the fact is that they are so tied up in detail work that they have little time for anything else and do not get that broad outlook on their work which is so necessary if they want to give the best that is possible to their employers. I will not say anything more on this subject because Colonel Franklin is to speak to you tonight on the subject "Men Make Systems—Systems Cannot Make Men" in which he will no doubt have something to say along these lines.

I will, however, say that I have very much appreciated receiving from time to time letters of appreciation from cost men, particularly regarding different reprints and articles which I have been sending out from our office. I select these articles from different accounting magazines, etc., which I receive personally, with a view of sending you those which I think will be of most assistance to you in your work, and it is only when I get these letters of appreciation that I know whether I am sending you the right kind of material or not. There can be no doubt, however, that the New York office could keep in closer touch with all of you if it published a regular monthly bulletin. I tried to do this, and one number was published, but owing to the expense I had to stop it.

Government Becoming Interested

You probably know that the Government, through the Department of Commerce and the U. S. Chamber of Commerce is becoming more and more interested in this subject of cost accounting for trade associations. I have kept in very close touch with both these organizations as well as the Federal Trade Commission in order that I might be properly posted regarding where we should draw the line in our cost activities. From my investigation I have come to the conclusion that there can be no doubt whatever about the legality of the comparative conversion costs which we suggested should be collected in the different groups in the industry. I have recently received from Mr. L. E. Warford, a special agent appointed by Mr. Hoover, in connection with the work being done by the Department of Commerce, to eliminate waste in industry, a chapter just now drafted on the subject of "Uniform Cost Accounting Activities of Trade Associations." I wrote Mr. Warford some time ago and stated that in my opinion our activities did not need supervising, but what we did need was to know just what we could and could not do. I asked them for an interpretation of the existing laws in view of certain legal decisions, but their reply was that the best way to ascertain what you could or could not do was to bring a test case. This seems to me to be a very absurd situation and I hope that a way will be found to overcome it. Judging from recent statements issued by Mr. Hoover's Department, it would appear that a way will soon be found to do this.

What Other Industries Are Doing

Before concluding this address I do not think it would be out of place to give you a few facts which you can take to

your executives regarding what other industries are doing to promote proper cost accounting and cost estimating methods in the individual mills or factories.

A progress chart has recently been issued by the Chamber of Commerce of the United States showing what 109 commodity lines have been doing in the direction of uniform cost accounting. Of the 109 commodities specified, 23 have drawn up classifications of accounts, 103 have formulated fairly complete cost systems, 38 have proceeded with the installation and 24 lines are adequately providing for further improvement and development of their uniform cost systems. The Fabricated Production Department of the Chamber of Commerce which issued this chart says that the following general truths may be deduced from an analysis of these 109 cost campaigns.

1. Immediate results must not be expected from a campaign for uniform cost methods. There is a considerable period necessary for cost education so that the interest of the manufacturers in a particular industry will be gradually aroused to the point where they will demand uniform cost accounting rather than to have it thrust upon them.

2. Cost accounting should not be considered an incidental and temporary service to the manufacturers of an industry but should be organized on a permanent and continuous basis. This may be done, first, by forming a cost association or department within the trade association where the cost accountants of the manufacturers may meet three or four times a year to discuss such improvements and changes as should be made in the standard cost system, or, a cost accountant may be employed by the secretary of the group who, in co-operation with the cost accounting committee, will promote such changes in the cost procedure as may be necessary from time to time.

3. The services of an outside cost expert are valuable and will be necessary at some point in the development of the uniform cost system, but these services should not be relied upon solely. Rather should there be developed the co-operation of those within the industry who are best posted on the cost practices and manufacturing problems of the industry.

4. Before proceeding with the establishing of uniform methods of cost determination it is necessary definitely to have in mind the objective; in other words, what it is hoped to accomplish, whether the cost accounting is to be used as a basis (a) for establishing individually fair selling prices, (b) for establishing departmental or commodity costs and profits, (c) for increasing individual efficiency, or (d) all three.

5. Before attempting any widespread improvement of the cost accounting in an industry, it will be necessary to ascertain the stage of development of cost accounting in the industry, whether it is in the job cost stage, the processes stage, or in the standard cost stage.

6. Cost accounting for an industry as far as possible should be placed on a self-sustaining basis. Customarily little appreciation is shown for service rendered without charge and those trade associations that have been most successful in their cost accounting work have organized the same on an independent self-sustaining basis.

7. It is important never to relax in the efforts to maintain the interest of manufacturers in cost work.

In my opinion this statement made by the Fabricated Production Department of the U. S. Chamber of Commerce accurately diagnoses the situation. Cost accounting absolutely must not be considered an incidental and temporary service to the manufacturers of this industry, but must be organized on a permanent and continuous basis. Moreover, immediate results must not be expected from a campaign for uniform cost methods. There is one thing we must always remember and that is the fact that the number of executives who believe a Cost Department unnecessary is gradually decreasing, also those who have cost departments are beginning to realize that they are not making the best use of them. Let me give you a few quotations from the Cost Association series issued by the Chamber of Commerce:

"A truly uniform cost system requires much give and take—the yielding of pet theories—the reconciling of divergent practices. There must be a wide and thorough interchange of cost experiences and cost methods, and all elements, both your small and large manufacturer must participate and co-operate in the devising of it. Accordingly, it is a mistake to formulate your uniform cost system too early in the game. As a correspondent wisely puts it, "A ready made Cost System hurts worse than a ready made shoe," and many cost efforts have failed because of inadequate preparation. The interest of the members of trade association must be aroused until a point is reached where the members will demand the uniform cost system rather than have it thrust upon them. This interest it is up to the secretary to create, which may mean much up-hill work."

Advantages of Uniform Cost Accounting

Finally I want to give you the following list of advantages to be derived from uniform cost accounting:

1. Strengthens position of industry in dealing with governmental or regulatory bodies.
2. Inspires confidence that selling prices are determined upon a fair and equitable basis.
3. Solves disputed points of accounting within the industry authoritatively.
4. Makes possible a more intelligent competition.
5. Reveals lines within the industry which have been marketed on an unprofitable basis.
6. Shows the danger line below which goods cannot be sold at a profit; thus serving as an insurer of profits.
7. Acts as a common guide to the value, efficiency and waste of workers, machines, methods, operations and plants.
8. Becomes a reliable guide and basis for estimating prospective business; thus acting as a forerunner for comprehensive production statistics.
9. Furnishes current reports for comparing major cost items with standards, which are predetermined and thereby measuring and increasing operating efficiency.
10. Establishes a standard code of accounting practice, so that if your cost clerk or bookkeeper leaves you, his successor will step into a system whose operation has been fully and completely formulated.

There can be no doubt that these are things worth trying for and it is up to us as representing the cost men in the pulp and paper industry to strive our utmost to see, therefore, that uniform cost accounting systems are installed in every group of manufacturers in the industry. The great thing we are trying to put over at this convention is the collection of comparative conversion cost statistics. We really believe that once we have begun collecting these statistics, no matter from how few in each group, we shall be on the right road to success, because it has been fully demonstrated in other cases that in but a short time other manufacturers will want to get our cost statements showing the conversion costs which they will only be able to do by themselves supplying their own figures. In this way each group will, like a snowball, grow larger and larger until in time it becomes practically 100 per cent. That is the goal we are aiming at—100 per cent in each group of the industry, but it will not be reached until everyone, both trade association secretaries as well as pulp and paper manufacturers, and pulp and paper cost accountants are really alive to the fact that the industry will not be on a sound economic basis until manufacturers making the same products use the same methods to find and estimate their costs.

Traffic Details in the Paper Industry*

By JOSEPH A. QUINLAN

Traffic Manager of the St. Regis Paper Company

QUITE often shipments are improperly described on bills of lading, with the result that exorbitant freight charges are assessed and collected. To a certain extent this is due to the fact that trade names are used instead of the real name of the commodity as listed in the Freight Classification. For instance, wrappers are very often shipped as such, instead of wrapping paper. You can not be too explicit in the description of the various kinds of paper or paper articles which you manufacture and ship.

Straight Demurrage and Average Agreements

Demurrage is a word which no one likes to hear, but you will continue to pay demurrage just as long as cars are unduly held. Your subordinates having charge of the unloading or loading of cars, may not be as conversant with demurrage rules as you are. While I appreciate the fact that you all have great responsibilities insofar as efficient machine operation and upkeep of your production, a little supervision on your part over the shipping and yard departments might bring to your attention a condition which is unnecessary and costly. I presume most of your mills are working under what is known as a "Debit and Credit Average Agreement" and therefore not entitled to any allowance for bunching in transit, but you should insist upon proper and daily switching service, and keep an accurate record of weather interference,

*Paper read before the Northwestern New York Division of the American Pulp and Paper Mill Superintendents' Association, held in Watertown, N. Y., November 15.

so that you may be able to secure an adjustment in the event that your demurrage bill for the month is incorrect.

I believe it is a good idea to accumulate as many credits as you can and while you can, for you never can tell what is going to happen before the end of the month to prevent you from handling all your cars within free time. Better play safe—that is the purpose of an average agreement.

In case of an accumulation of cars, just take hold of the situation yourselves, and see that the oldest cars are unloaded first. If you allow your men to unload the first cars they come to, instead of those which have been the longest in your yard, you will soon bring about additional debits which are very costly at the rate of $5.00 per car per day.

Much can be said in connection with proper handling of traffic in all its phases, such as tracing, car orders, embargoes, overcharge and damage claims.

Care in Loading Is Essential

Cars should be properly lined, all protruding nails and bolts should be removed, and, in one word, cars should be made fit for the safe transportation of paper before they are used.

Place yourselves in the position of your customers. How would you like to receive a car of paper with practically every roll damaged by water, or torn by nails protruding from sides of car, or with the edges of the paper all cut because of the poor condition of the car floor? How long would you trade with the paper manufacturer whom you represent today?

Paper should be loaded in cars strictly according to the rules of the American Railway Association. That is, the rolls should be properly blocked to prevent shifting, and a board should be nailed across the door, so that the rolls will not come in contact with the car doors and cause them to bulge.

I believe in preventing a claim rather than in presenting one. Railroad companies, particularly the New York Central Railroad, are spending annually an enormous amount of money, in their attempt to prevent claims resulting from damages and losses in transit. We should co-operate with them to the fullest extent.

The removal of all old consignment marks from packages naturally concerns only those who have occasion to make shipments in less than carload lots. Many times I have seen shippers utilize a box or container in which to pack their goods, and either inadvertently or purposely omit to erase all or a part of the old marks from the box or container. What is the result? Such a shipment is bound to be badly delayed or lost in transit. The delay would occur because if the discrepancy in the markings is discovered in transit, the railroad company holding the shipment indefinitely pending receipt of correct information from the original point of shipment, or they might hold the billing and forward the shipment to the wrong destination, causing it to be returned later on astray billing.

You will realize that in the great multitude of less than carload shipments handled at large transfer points, the chances are very good that a shipment which becomes separated from the bill will become lost.

While we are on the subject, it might be well to say that less than carload shipments should be shipped in containers sufficiently strong to carry the weight or bulk which they contain.

Most of us, I believe, are more concerned with shipping of a carload nature.

Whatever you do, never load a car which is unfit for paper loading. A short time ago, a certain superintendent in this vicinity was loading a car which was entirely unfit, and when the condition of the car was pointed out to him by representatives of the railroad company, he answered that this car was furnished for loading and that he would load it anyway. Very heavy damage follows the use of such cars. Having in mind the protection of the interests of your customers, would it not be much better to make careful examination of the car at first, and after drawing the attention of the railroad company to the condition of the car which they furnished on specific order for paper loading, request them to furnish you with another car immediately. The delay incurred would not amount to very much, and your shipment would reach destination several days before the first car, for that would have necessitated transferring shipment or repairing car in transit.

You may say to me, "If we load the car which the railroad company furnishes for loading, can we present claim for damages." Let me say to you that presenting a claim under such circumstances is a lot easier than collecting same. What is the use of presenting claims which you can not collect? That is like the man who is fooling himself on his cost sheet.

The Co-ordination of Expense Items in Preparing Departmental Budget*

By JAMES A. REILLY

THE good ship Business cannot be successfully piloted without the substantial rudder, Knowledge. For a clear course, let us see how Webster defines "Knowledge." Here is his definition: "(1) A clear and certain perception of that which exists, or of truth and fact; (2) learning; (3) illumination of mind."

Surely, no man will admit that knowledge is not absolutely necessary in the conduct of one's business. You men can readily see that the information we ask of you whether it is in the form of beater reports, labor distribution, or of steam and power distribution reports, etc., falls within the definition as given by Webster. Nor does it matter whether we term these reports—"cost," "knowledge," or whatnot.

"Illumination of mind;" in some cases we admit that this is more or less of a dark color; nevertheless, it brings before us a clear perception of that which exists.

If I had been asked five years ago to prepare a paper on the subject of cost to be read before superintendents, I can truthfully say that I would have had material enough on my desk for a paper that would easily take several hours to read. The subjects would have been actual cases where we had failed to get the accurate reports from the manufacturing department. Today, however, conditions are decidedly different, much to the advantage of the pulp and paper industry.

The cost man has become more "civilized" and does not request of the superintendents things that are not practical. He, from his talks with the superintendents over cost reports, has gained much practical knowledge; so today he is not looked upon as an unnecessary burden, but more as a needed part of the organization, ready and willing at all times to assist you in your pursuits for greater efficiency.

You, Mr. Superintendent, have also changed your viewpoint on the subject of cost, and, I am most happy to say, in the right direction. You are willing to meet the cost man on a 50-50 basis, and when heads of departments work on this basis, surely it means success for the organization.

Progress Is Slow

We all admit that the progress of cost methods has been slow. Perhaps the cost man failed to sell his system to the superintendent or the methods he used were not practical, or the new departure was so radical a change that the executives put but little faith in them; there are many reasons for this slow progress. You know them as well as I. But, today, we have placed cost on a solid foundation. Just watch cost grow; not, however, like the "Eskimo Pie," with great success at the beginning, then to cease in demand to such an extent that it is seldom spoken of as a standard article.

What evidence have I to prove the assertion just made that you superintendents are doing your part to promote good cost? Under date of October 24th I mailed a letter to every cost man in the paper mills located in this vicinity, 75 in all, asking each one to cite actual cases where his superintendent was a little lax in cost reports. I promised to treat all cases confidentially. What was the result? I have had only one reply in writing and one verbally. Neither was of importance, nor was any specific case given, so I am not going to mention either at this meeting.

At the recent cost convention held in this hall I talked with many of the cost men and they personally told me that what little trouble they were having now could easily be straightened out. Moreover, they had confidence in their superintendents to such an extent that their cost would stand up under fire.

Do you know of another industry equal in importance to the pulp and paper industry that can equal or surpass this record? Personally, I do not.

That, then, is the particular reason why I have chosen the subject of *budgets* for today's meeting. You men are familiar with all mill reports that you submit to the cost department, but I hardly think that we have ever informed you as to the method we employ to derive at our cost per operating hour. We have mentioned machine hour cost to you several times, but I have no recollection of ever seeing any reports to superintendents treating on this subject.

Determination of departmental rates and the preparation of an expense budget differ but a little. Our department rates are on a normal basis, and therefore very simple to change if necessary to prepare a budget on a 50% operation.

*Read before the meeting of the American Pulp and Paper Mill Superintendents' Association, Connecticut Valley Division, held at Holyoke, November 18.

In all well established lines of business, the executives study past records for the purpose of preventing in the future the duplication of errors committed in the past. The future is a gamble, but the wise executive prefers to base his judgment upon the most accurate information that is available rather than to plunge into the dark without a light; consequently, the accountant, whether he be a commercial or a cost accountant, is requested to assist in the preparation of the expense budget. The budget, therefore, is the financial requirement to lay before a committee as an estimate for a given period.

A quotation from the pamphlet entitled "Budgeting for Business Control," issued by the Fabricated Production Department, Chamber of Commerce of the United States, on the Possibilities of Budget, reads as follows:

Budgetary Control

"Budgetary control may mean much or little. It may mean merely the multiplication of useless forms, the only effect of which is to hamper and further impede production and sales. On the other hand, budgetary control may mean the wise conduct of business, the subordination of pleasant dreams to actualities. The forms for budgetary control are not so material; (it is questionable whether many additional forms are necessary or desirable). It is the spirit behind the budget that is important, for, a budget, to amount to anything, must be predicated at least upon a knowledge of what a plant can do, of what are reasonable sales expectancies, of what financial resources are required and available for the sales and production programs.

"At the very outset it should be emphasized that the budget cannot, nor is it intended, to take the place of able and skillful executives. The purpose of the budget is to reconcile and coordinate the effects of these executives, to draw from them definite promises of accomplishment from which to set definite goals, and to check actual performances in the terms of these goals; and we may safely go on the assumption that, if we draw from the executive definite promises of what they expect to do, "It follows, as the day the night," that they will leave no stone unturned to make good on these promises. For, if they fail for reasons within their control, it means eventually a change in management.

The advantages that are claimed for budget making may be summarized as follows:

1. Everyone in the establishment will have a definite goal for attainment.
2. Sales and production plans can be co-ordinated with financial resources.
3. More continuous operation and greater regularity of employment can be provided.
4. Products, processes and equipment can be standardized.
5. Costs can be used for purposes of control rather than as historical information.
6. Reduction of waste will be encouraged by the maintenance of better balanced inventories, by instituting wage payments based upon results, by definitely assigning responsibility for expenditures.
7. Taken in conjunction with the business cycle, the budget will give warning when to be cautious and furnish the cue to go forward with manufacturing plans.
8. At all times, the budget serves as a measuring stick to compare actual performances with promises and standards, showing not only what may be done but what should be done.

Budgets Based on Quota

Budgets, as a rule, are based on sales quota. We will assume, therefore, in order that I may adhere more closely to my subject, that the requirements for all material, commercial, selling and administrative expenses have been taken care of. It now remains for us to handle the departmental or manufacturing expense budget.

We have found that, due to the different items of expenses in the various departments, the total of our budget may be more accurately computed if we determine the financial requirements for each department and then summarized them to ascertain the total.

The items of expense are classified under four main headings: 01—Labor; 02—Supplies; 03—Fixed Charges; 04—Miscellaneous Items.

The various departments of the plant are divided into two main groups: A—Production departments; B—Auxiliary departments.

In making this expense budget we do not simply rely upon past records, but we find it very necessary to consult with the superintendents, engineers, and purchasing agents in order that we may arrive at a figure which will be as near the actual performance as possible.

Labor

We consult with the superintendent relative to the number of employees per unit of equipment or department. With the schedule rates at our office we actually make out a payroll for a given period for budget purposes. From our sales quota we estimate the number of hours which the various pieces of equipment operate and thereby determine the total labor for a given period; in this particular case, one month.

Supplies

This item of "supplies" refers principally to small items such as brooms, pails, and other small perishable articles; we determine the figures from past records. On machine felts and wires, we submit to the superintendent our findings from past records, as to the probable life of each. After we have received his approval, we then consult with the purchasing department as to the market price of these commodities for the periods for which we are preparing our budget. Making the compilation, we arrive at the estimated cost of felts and wires for the period.

Fuel: The Engineering department supplies us with an estimate of probable consumption, the purchasing department with the unit price.

Box Boards and Nails are based from past records and figures taken from a special report on this particular subject and supplied by the engineering department. We have the average quantity of lumber and nails per case. From our sales quota we make an analysis for the purpose of finding the number of cases to be required for the period.

Wrappers and twine are figured on a schedule similar to box boards and nails.

Fixed Charges

A. Taxes.
B. Insurance on Building and Equipment.
C. Depreciation.
D. Employee Compensation Insurance.

Taxes, insurance, and depreciation are all pro-rated over the various departments on a valuation basis.

Employee Compensation Insurance is distributed on a payroll basis.

Miscellaneous Items

Such items include demurrage, reserves for inventory variances, division office salaries, unclassified expense, etc. All these items are charged to the auxiliary departments and eventually pro-rated over the productive departments. After having ascertained the total direct expense of the plant we then total the auxiliary departments and pro-rate over the various productive departments.

Auxiliary departments are classified as follows: A—Steam; B—Power; C—Building; D—Millwright; E—General Plant.

Steam: The total cost af steam is distributed to the various productive and auxiliary departments on a consumption basis. If meters are not available, the engineering department is called upon to assist in the proper distribution.

Power: The total cost of power is distributed likewise, on a consumption basis.

Building Expense: This includes such items as cost of operating and maintaining elevators, janitor service, and steam used for heating, etc. In our particular mills the steam used for heating is distributed on a consumption basis as furnished by the engineering department. The balance of expenses under building is spread over the other departments on a floor space basis, percentage of each department to the total.

Millwright: This is indirect expense entirely and is distributed to the department, job, or project on the basis of millwright hours chargeable to each.

General Plant: This is charged with all items of expense that rightly belong to the plant but not directly to any one department; such as division office salaries, demurrage, yard men, and inventory variances. This is really nothing more than a dumping ground for expenses that cannot be classified departmentally. This total is distributed over the various other departments on the percentage that each department's direct expense bears to the total direct expense of the plant.

Department Rate: Having determined the total cost of each productive department, including the proportional part of the auxiliary departments, we then make the division, using the normal number of units as the divisor to ascertain the department rates. I quote a paragraph from a letter that I received recently from E. W. McCullough, manager of the Fabricated Production Department, relative to the pamphlet, "Budgeting for Business Control":

"There is always some danger, when signs of the times point to our entering either a period of prosperity or de-

pression, that certain circumstances or incidents may cause undue haste in proceeding in a direction which may later prove exceedingly detrimental. The period of inflation following the war is a fitting illustration. It is our belief that better individual control can be had by planning ahead, which after all is what is meant by 'budgeting.'"

How the Superintendent Can Help the Cost Man

Surely, you superintendents can readily see the necessity for the preparing of expense budgets. How, then, can you be of service to us so that we may submit to our chief executive a report as nearly correct as possible? My suggestions are as follows:

1. Do your best to have all mill reports accurate.
2. Submit your reports promptly.
3. Notify the cost department of any changes in your manufacturing procedure so that the cost manager may make changes in rates if necessary.
4. Insist upon changes in standards if you are satisfied that the estimate is greatly in error.
5. If information pertaining to manufacturing is not sent you, call upon the cost department for it.
6. Have this local division of the Superintendents' Association prepare a standard report that the cost man must fill in and report to you periodically.
7. Request further analysis of items that vary from standard.

Conclusion

Through close co-operation of superintendent and cost men, not only in their own plants but in our two strong Connecticut Valley Local Associations, the superintendents' and the cost, both will be more than doubly benefited than is possible by working separately.

The Connecticut Valley Local Cost Association is at your command—how can we be of service to you?

A Successful Suction Roll*

By H. O. BING

The Sandusky Foundry & Machine Co.

SUCTION rolls are not new to the paper industry, having been tried decades ago, at which time they were pronounced a failure. The first successful suction roll was developed by Mr. W. H. Millspaugh, president of The Sandusky Foundry & Machine Co., in 1908 and installed the same year at the mill of the Hammersley Mfg. Co., Garfield, N. J., making grease-proof paper.

The difficulties experienced in introducing the suction roll to the paper trade covered a period of nearly two years and to enumerate these attempts would be monotonous; in fact, you superintendents did not organize yourselves to listen to some individual wailing about the past. The purpose of the Superintendents' Association is to bring about a better co-operation in the furtherance of the future development of new methods and devices of greater improvements in the economical art of paper-making.

As a personal representative of The Sandusky Foundry & Machine Co., I was asked by your chairman, Mr. Homer Stafford, to present a paper on the Millspaugh suction roll and I hope my subject may be of interest to you. Having been closely associated with the paper industry for the past fifteen years and connected with the Millspaugh suction rolls, I will present the subject assigned to me in the language of the machine room.

Water Removed By Pressure

In order to properly understand the operating principle of suction rolls, it must be remembered that after the sheet or web of paper has been formed on the Fourdrinier wire, the essential remaining problem as far as the paper machine is concerned is largely one of removing the water that is held in suspension with or in the paper fibers. This is, as we all know, accomplished to a greater degree by the pressure on the wet end of the machine and to a lesser degree by evaporation on the dry end, but there are different ways of applying the pressure on the wet end and the method employed largely depends on the character of the finished paper and its rate of production. The water must be eliminated rapidly, yet if it is done violently, the quality of the paper suffers accordingly and breaks—the bane of a machine tender's existence—are sure to follow.

The Millspaugh suction roll is a simple device, easily understood and handled, that takes the place of the lower couch roll, and the top couch roll with its jacket, guard-board, weights and levers, etc., are dispensed with.

Having a perforated bronze shell driven by bearers through the shaft, the suction box, which is stationary, has attached extruded, bronze metal packing channels. Inserted are hydraulic packing strips forming a contact on the inner surface of the shell. Confining the suction area between these strips, means are provided to regulate same, reducing the contact to a minimum and vacuum produced by a positive rotary pump.

Vacuum is here used as a term expressing the difference in pressure between the atmosphere and that maintained within the area subjected to action of the pump regardless of the difference in pressure.

Atmospheric Pressure Replaces Mechanical Pressure

With suction rolls, live pressure is replaced by atmospheric pressure, which is both constant and uniform and is applied to a controllable unit of area on the moist paper and the water removed by a combination of three factors:

First, direct pressure on the paper equal to the difference in pressure between that maintained in the suction box and the atmospheric pressure; second, by physical contact of the air passing at high speed through the paper with the water, thus atomizing a portion of the water, and carrying it forward with the air; third, by actual absorption of the moisture in the paper by the air, the air being considered as a sponge or blotter. Ample evidence of this triple effect has been noted.

Suction rolls simplify the process of making paper. The various mechanical difficulties that have always bothered the operator and held down production have been removed; consequently more and better paper is being made per square foot of wire than can be made with the conventional equipment. It was found that book paper made over suction rolls is more alike on both sides, that the sheet is better closed, has greater clay retention, takes better laid and water-marks and as it was not strained at the couch rolls, it takes offset, multi-color printing and map printing in a better manner. With the improved qualities mentioned by elimination of breaks at the couch and the better conditioning of the sheet, more and better paper was made at the same speed. In most cases the speed was increased. If my memory serves me correctly, the first Millspaugh suction roll was installed at the King Paper Company on book paper and an increase of 300 pounds per hour was made the second day the suction roll ran.

At one mill making heavy papers similar to the Library Bureau, the output of the machine was about doubled, due to elimination of crush and other disadvantages.

Fine writings, bonds, ledgers, wedding, etc., have been found more uniform in appearance, better closed and the same advantage in water-marking observed. It is noted that a clearer water mark results from the fact that the couch roll does not press out the Dandy roll mark as it is left clear and distinct. With improved quality, has come increased production on these grades.

The suction roll, when aniline colors are used, does not increase any difference in shade of the two sides of the sheet. There is no branch of the industry in which suction rolls have proven their merits as on news print and no branch has been slower to adopt them.

With the combination of suction couch and suction press on news, not only is quality maintained but speeds of 1,000 feet per minute are possible, with a saving in both cost of felts and wires per ton of paper. Your local manufacturer of paper machines has four high speed news machines at the St. Maurice Lumber Co., Three Rivers, Quebec, equipped with Millspaugh suction couch and suction press operating very satisfactorily in the neighborhood of 1,000 feet per minute.

It is fortunate for the industry and for us that the first installation of suction press rolls was made in a mill having a progressive and unusually well informed superintendent who gave his personal attention to the details of operation. It is a pleasure indeed to acknowledge the value given us by our friend, M. J. Argy, superintendent of the Cliff Paper Co.

Suction Press Aids Manufacture of News

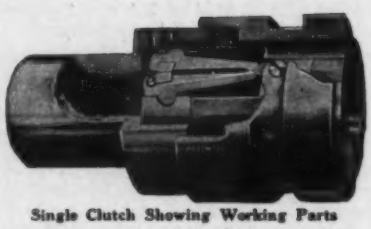
The suction press has made possible the advancement attained in the manufacture of newsprint, as it performs several functions, all of which are valuable to the operation and production of the machine.

Anyone who has observed the operation of a pair of plain press rolls, has noticed the pond of water at the nip of the rolls caused by the inability of this water to escape. The capillary attraction of the bottom roll holds the water into the nip of the rolls and the faster the machine runs, the more prevalent this condition becomes. The presence of the pond of water is extremely detrimental since the already partially dry paper and felt passes through this bath of unclean water at the same time that it undergoes pressing intended to remove water.

*Read before the meeting of American Pulp and Paper Mill Superintendents, held at Watertown, N. Y., November 15.

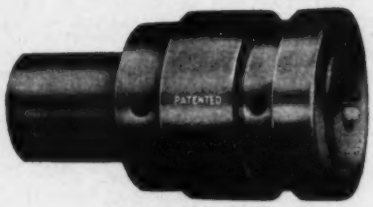
THE JOHNSON FRICTION CLUTCH

IS THE RELIABLE AND EFFICIENT
LINE-SHAFT CLUTCH



Single Clutch Showing Working Parts

Small, Compact, Powerful and Durable
A Quality Product



Single Clutch—Exterior

Start the Year 1923 Right by Using a Johnson Clutch

Drive your machinery direct from the line-shaft with a

Johnson Single Clutch

and do away with extra equipment when counter-shafts are used.

A saving in expense and upkeep worth considering.

Single Clutch With Steel Split Pulley Mounted on Hub

All machinery cannot be driven from line-shaft on account of the difference in speed and reverse motion desired.

The Johnson Double Clutch

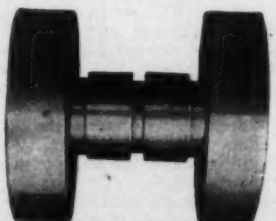
is designed to take care of these conditions.

Requires but little more space than a single clutch.

Our engineers will be glad to work out your clutch problems for you
Send for clutch information blank

Double Clutch—Exterior

Write for Catalog "PI"



Double Clutch With Pulleys on Hubs

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

A suction press roll maintains a dry nip because the water pressed out by the top roll is instantly removed through the suction roll, therefore, crushing, blowing and felt marking are eliminated.

The paper is delivered from the suction press roll several percent dryer than is possible by the conventional presses, the production of the machine may be increased and the steam consumption in the dryers may be reduced. Breaks are practically eliminated, irrespective of the speed of the machine. In the ordinary presses, the sheet has a natural tendency to stick to the top press roll and can only be separated from it by the pull of the felt. If the force required is greater than the strength of the wet sheet, the latter will invariably break. Much production is lost in press breaks which can be saved.

In a suction press, the sheet is held down to the felt by atmospheric pressure which is sufficient to overcome any tendency to stick to the top roll. Breaks do not occur, even though lumps and slime spots appear on the sheet. It is the safe running feature that makes the suction press invaluable to high operating speeds on light weight papers. High speed without safe running is not worth while.

The saving in felts is due to the large volume of air that passes through continuously, keeping the felt open and clean, requiring fewer shutdowns for washing. As a matter of fact, some mills using suction press rolls do not wash felts but once a week, resulting in increased production of salable paper.

The top press roll which is either wood or rubber covered, does not require heavy weighting. The weight of the top roll combined with the atmospheric pressure is sufficient for the purpose. Better quality of paper is obtained because it is not subjected to harsh, mechanical pressing. Like the suction couch roll, the suction press roll does not disturb the formation of the fibers, consequently the sheet has greater strength, showing a greater Mullen pop test from two to five points.

Thus the suction press has been confined to machines making such grades as kraft, news, bag, manillas, sulphite bond, glassine, tissue and fruit wrapping. They are not used on soft book stock, because of the tendency to mark the soft sheets. I might add that we have under construction a suction press for one of the large Western book paper manufacturers, which has incorporated features that Mr. Millspaugh hopes will overcome the marking.

The Pulp and Paper Cost Accountant—His Past, Present and Future place in the Industry*

By SETH L. BUSH

Ex-President of the Cost Association of the Paper Industry

I SUPPOSE it would be most proper for me as president at this time to present my report, making reference to the particular activities which we have been concerned with as an association during the past year. I am going to leave all that, however, to our secretary-treasurer, Mr. Burke, upon whom we have come to depend so much for the execution of our plans.

The facts of the case are that the real "works" of the Cost Association of the Paper Industry are at 18 E. 41st St., in the person of Mr. Thos. J. Burke. That is exactly as it should be, for none of us, who are busy in the positions we hold with our respective companies, can expect to put in time enough to push forward the work of the association, except through a competent manager at our central office.

Because I am retiring as president, I want to take advantage of this opportunity to say thank you very sincerely to all, whether they be officers, members of committees, or any others who have helped along our work. Thank you for the splendid co-operation you have shown so often in helping further the plans we have undertaken from time to time. Our work could not have advanced to its present stage if you, who have been most interested, had not been willing to give largely and unselfishly of your time and personal efforts, and even of your good cold cash when necessary, in the way of traveling expenses, etc. I want you to know that your co-operation has really been appreciated by those of us who have acted as your officers. And I want to speak just a word of public commendation for the very fine way in which Mr. Burke has been filling the position of secretary-treasurer of our association. We could not ask for a better attitude than he has shown, nor for better service than he has been striving to give us. We owe him much more than is conveyed in his monthly salary and he can feel content in a job well done, although we hope he'll never be satisfied either with himself or with us, or with the perfection of the cost accounting of the paper industry. And that brings me to my real story.

Looking Back For a Few Years

I have had the distinct privilege of being actively associated with the work of this Cost Association ever since its inception, and I hope I may be pardoned for reminiscing a little. I remember when concerted action was being proposed along the lines of cost accounting in our industry. A very well known company which has been one of the best supporters of our work, wrote a letter stating that they had the last word on cost accounting at their plant, and were not interested in going into it any further, and did not care to spend any of their time or money conferring with anybody about it. Needless to say this concern would be considerably chagrined if I were to hold this letter in front of them, for today they are not only anxious to learn more and to co-operate thoroughly with the rest of us, but they stand ready actually to serve in any way they can.

I well remember an early convention of our association, held in this very room, when we were all so unwilling to overlook our differences and find a beginning on the things to which we could agree. I remember how Col. Franklin and I exchanged some verbal shots which were anything but pleasant. Those were the days when we were more willing to fight about detail methods than we were to co-operatively advance underlying principles. I refer to these things in order to bring forcibly to your mind the change which has occurred during the space of only three or four years. We are apt to forget that it is such a short while ago that a real good cost system was considered as an extra and almost unnecessary appendage to a business organization and certainly as a luxury. Those were the days when the cost accountant himself was looked upon with considerable suspicion. The bookkeeper in the office, the workmen in the mill, the foreman, the superintendent, and even the president or the board of directors, who hired him kept a watchful eye on him, to make sure he didn't run away with something, because a man so full of system as he of course could not be trusted. In those days some of you were ever on the alert to see that your competitors found out nothing whatsoever about your methods, because of course you had the best there were, and could not afford to give anything away.

In that dim past of only a few years ago, the manufacturer who depended solely upon the figures he could put together out of the air after a few contortions of his memory, or could gather together by the aid of a second rate clerk, or the bookkeeper on his stool in the corner, was considered by many to be the most sound and reliable business man and the best financial risk because he was not foolish enough to be carried away by the wild-eyed schemes of the expert cost accountant. None of us can deny these things if we will but face our own memories.

Today It Is Different

Today the story is different and I openly challenge those who think there is no use in spending their time and money in the work of the Cost Association of the Paper Industry to look matters in the face. For I say to you without fear of contradiction that the paper industry has come within these few years from a very unenviable position as a backward industry, as far as accounting methods are concerned, to the enviable position of being in the front rank among those industries which are blazing the way for a better industrial America, by bringing steadily nearer to perfection the industrial compass which cost accounting can and should be. And the progress we have made in this direction in the paper industry has been almost entirely due to the men who have been actively carrying on, or have been freely backing the work of the Cost Association of the Paper Industry.

Today cost accounting and general accounting, built upon practical principles the soundness of which has over and over again been demonstrated, have been tied together as one dependable accounting unit, forming the very center around which our most efficient industrial plants revolve.

Three years ago, very few among the paper mills understood anything about a budget cost system. Today we can not help admitting that the most efficient handling of our business can result only from the intelligent use of some sort of budget comparisons.

I recently received a preliminary copy of a pamphlet which will shortly be issued by the Fabricated Production Depart-

*Address delivered at Cost Convention at Holyoke, Mass., Thursday, November 9th, 1922.

ment of the U. S. Chamber of Commerce, dealing with the subject "Budgetary Control." I would advise every one of you to read it carefully, because it presents the subject of budgets in business in a wonderfully comprehensive way. Who but the capable cost accountant can furnish for us these budget comparisons and who can read them and draw the proper conclusions from them more correctly than he? The able cost accountant has discovered that he is today depended upon to an unlimited degree, by the comptroller or the treasurer, or whatever officer has in charge the financial affairs of the concern. Today, the sales department which does not look well to the guidance which the cost accountant's figures can give, is riding to a certain fall. The operating department, the man in the mill, is just beginning to realize what a dependence he can place upon the cost accountant in keeping straight so many of the tangles of his mill administration. I could talk to you for hours about the details of the assistance which can be given in each of these directions but I believe I have shown to you clearly why I say that the able cost accountant who is today filling his rightful place, is directing the destinies not only of his own department which is at the very core, but also of each of the three other departments—the financial, the operating and the distributing.

Association Membership of Great Value

These are not beautiful theories of what might be. I am giving you the facts as they stand in the aggressive forward looking paper mills today. What a change in the space of so few years! I can frankly say that I have no patience with the paper mill which so glibly excuses itself from participation in our association work by stating that they have received no particular benefits from their hundred dollar dues in this association and are therefore withdrawing. I submit to you that the progress in which this association has been so large a factor is worth not $100 per year but $1,000 per year to any mill which is planning to stay in the paper business. To many mills it has been worth much more than that.

If the situation today as I have described it does not hold true in the mills you represent as a cost accountant, then there is one of two things the trouble. Either you are not the kind of cost accountant you ought to be or else your mill is sadly lacking in wise management.

But what of the future? I know what the conditions have been in the past for I have a thoroughly good memory for such things. I know what the conditions are today, for I have been closely in touch with them since I have acted as the president of your association. I suppose I am no better prophet of the future than anyone might be; yet I believe I can draw a few conclusions which would be entirely natural for any of us to reach. If we conclude that the ideal in cost accounting has been reached, that perfection is at hand, when we have merely learned to go through the routine motions which are necessary to produce the most approved records as they are known today, we are shooting very wide of the mark.

Accounting Records in their Infancy

I firmly believe that accounting records as an aid to the development and permanency of our paper industry, are as yet in their infancy. One outstanding proof of this lies in the possibilities which we can see from the standardization of methods and co-operation along the lines to be suggested to us at this very convention. No paper mill can afford to stand aloof in such work. Those whose accounting records are not at present in such shape that they can fully co-operate, can well afford to spend thousands of dollars if necessary to put themselves immediately into line to reap the benefits of this progressive work which our association is to undertake. It would be impossible for me or for any of us to outline in detail any of the steps which are undoubtedly ahead of us in the more extensive and practical use of the information we will develop from our accounting records. But I can with confidence predict that the successful mill superintendent of the future must be sufficiently familiar with its meaning to be able to effectively use such accounting information as deals with his problems. I predict that gradually there will develop throughout the paper industry the sound practice of procuring sales at prices based upon known cost rather than upon what the customer says some other salesman quoted him. And I predict that the most capable managers of tomorrow, in whose hands the stockholders of your concerns can place their interests with the greatest feeling of confidence and safety, will be the men who have as one of their outstanding qualities that of a real ability to interpret and use effectively the information coming to them regularly from a well ordered and up-to-date accounting department.

I hope to see the time in the immediate future when cost accounting as a separate entity will gradually disappear because it will have gradually won over to its forward looking program the old time conservative conception of general accounting, and we will have an accounting unit which will exist for the purpose of furnishing all accounting information of whatever nature in a way that it can be most effectively used in best guiding the operations of the company.

Wonderful Future For Cost Man

If these possibilities I see in the future can be attained, there is a wonderful opportunity for the cost accountant of today as he builds into the field of tomorrow. The advance which the cost accountant and his profession have made during the last few years in the paper industry, almost astounds us if we will but think it over, but I confidently believe that the importance of his position in the paper industry during the days and years to come, will multiply even more rapidly than we have seen it thus far. And I want to say to you who are cost accountants that the rapidity of your development depends mostly upon you yourselves. The advance which I have been talking about will carry the accounting methods ahead in all of our mills to a greater or less extent and unless you are big enough to fill the job which is before you, you will some day be lost by the wayside. No advance in methods can carry you with it unless you are capable of keeping the pace and your highest attainment in the field you have chosen for your present work can come to you only so far as you earnestly strive to forge ahead in the very advance guard of the rapidly changing situation.

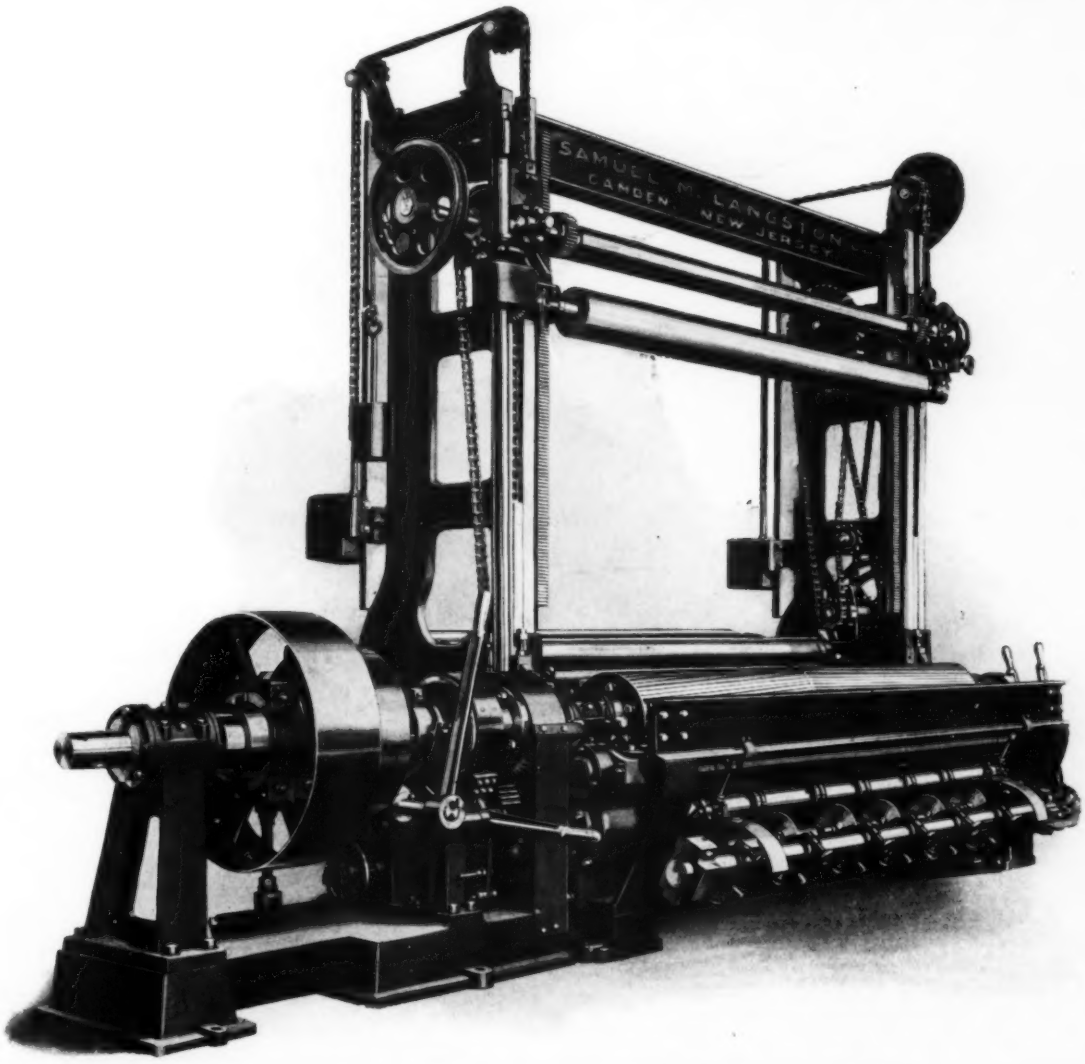
You have a wonderful field in which to develop yourselves through the convention programs of this association where plenty of opportunity is given for discussion and through the regular meetings held by our various local divisions. Activities will be rapidly getting under way in the various groups along the lines of the forward looking program which will be presented to you at this convention. Through your opportunity to communicate directly with our New York office, you may submit to others any problems which confront you or offer suggestions which you may have in mind. If you do not use these advantages you only are at fault. If you fail to match your ideas with others in the same line of work, thus gaining the value of lively discussion with them, you are that much less able to carry conviction as you try to interpret to those in authority in your own organization the conclusions you have drawn from your figures.

If you feel that the management of your concern is not giving full consideration to you and your department, look well to your own ability, for if you are the kind of cost accountant you ought to be and the kind the future is going to demand, you will not wait for some one to recognize you but rather you will force proper attention to the results of your work through your ability to rightly interpret the message which your figures should regularly carry to your management. It is no longer a question as to whether up-to-date cost accounting should be or should not be, or whether a progressive concern should or should not have a cost accountant. All that has been settled. The only question in this matter which remains for us as paper making organizations is, how much are we going to allow ourselves to lose by too slowly getting into line? And the only question which you as cost accountants have before you on this matter is, how much am I going to blight my own future by merely drifting with the tide, or allowing myself to be pulled along by necessity rather than forging ahead with both eyes on the ideal of my opportunity.

It has been my intention this morning to avoid details in order to bring to your minds a very general picture of the rapid progress we are really making together. I feel it is worth while for us all to stand aside for just these few moments and give ourselves a thorough "once over" as we watch ourselves go by. Then we can tighten our belts and go back to our jobs with renewed energy and a renewed and increased appreciation of the kind of co-operation which our association together affords.

A few years ago, a paper mill cost accountant, no matter how able, was considered by many as a very questionable asset and by some as a pronounced liability. Today the same accountant finds himself established in the confidence of his management as an indispensable part of the organization. Tomorrow I am sure that he who deserves because of redoubled efforts, is to be doubly rewarded.

In closing may I say that it has been one of the most enjoyable experiences of my business life to have served in an active capacity with you in this association work and although I am not now closely identified with actual cost accounting details, I shall continue to have the greatest interest in helping in any way I can such a worth while program as you have before you.



Type "DA" Langston Slitter and Winder Built and Guaranteed for 2,000 Lineal Feet Per Minute

Balanced rolls and shafts, with ball and roller bearings mean high speed

Heavy construction means long life

SAMUEL M. LANGSTON COMPANY

CAMDEN, N. J., U. S. A.

A Merry Christmas
and
A Happy New Year

The
SHARTLE BROTHERS
MACHINE COMPANY
MIDDLETOWN • OHIO

Loading and Filling Materials*

By CARL C. SCHNEIDER
Knowlton Brothers, Inc., Watertown, N. Y.

UNDER the above name we understand substances as clay, domestic and imported, Talc, Gypsum, Precipitated chalk, Asbestine, Pearl Hardening, Heavy Spar and Witherite. The fillers just mentioned, with perhaps others not named here, are sold under all kinds of names. Certain colors, as Umber, Ochre, Red Oxide, etc., also increase the ash of the paper. The loading effect of these materials is, however, only an incident, and as the coloring value of same is their real purpose, no further consideration will be given these substances in this paper. Filling and loading agents are added to the paper for several reasons.

Fillers tend to increase the weight of the paper, improve the feel, make a better printing surface, enable the paper to obtain a better finish on calendering, make it more opaque, and also enable same to take the printer's ink better.

A filler is, therefore, not to be considered as an adulterant with the exception of one single instance, in connection with which, a very cheap paper is demanded.

The kind of loading material to be used depends on the grade of paper to be made and the qualifications which the latter has to possess.

The principal qualities a filler has to possess are: Color, fineness, absence of grit, iron, calcium carbonate, mica and moisture.

The color must be as pure a white as possible. In judging the color of clay or talc, it is advisable to make sure that the white color has not been artificially improved through the addition of a blue coloring matter, very often ultramarine blue.

The fineness of the filler is very important, as in regards to its retention. This, of course, does not alone determine the degree of retention. Other factors in this respect are: the kind of stock used; slow or free beating stock; a thick or thin sheet; light or heavy suction; as also the amount of rosin size used.

The fineness of the loading agent is best determined with the help of the miscroscope.

It probably will be of interest to you to know of the results of an experiment made, as to the loss of filler taking place at different parts of the paper machine in a mill in Germany. The ash in the air dry stock at various points was as follows:

Stock from the chest	20%
Stock just before suction boxes	19%
Stock after the couch	15%
Stock after the first press	14%
Stock after the second press	13.5%
Finished paper	13%

The stock was 25% sulphite and 75% ground wood. Weight of paper was 50 grms. per square meter.

The retention of filler fluctuates between 30% and 90% of the amount originally added, 50% is to be considered satisfactory.

Grit Causes Trouble

Grit, if present in any considerable amount, will cause unnecessary wear of the wire felts and jackets, also will make pinholes and possibly may give serious trouble in printing.

Grit, in my estimation, is best tested for, by either the flotation process or placing a certain amount on a standard mesh screen and washing it with a spray of water until the water running away is perfectly clear. As to the amount of grit to be allowed, nothing can be stated, as to my knowledge no standard has been set up. I have, however, seen a suggestion from England as follows:

China clay for coating not more than 1% grit.
China clay for fine paper not more than 0.25% grit.
China clay for news not more than 0.5% grit.

Low grade clays containing from 5% to 10% of mica should be described commercially as "mica clays."

Mica has the same bad effects on paper as grit of another nature, besides producing shining spots on the paper.

Iron should be present in as small an amount as possible for the same reason as in all other paper-making material. Iron in the paper, introduced with the filler or in any other way, will form with resinous matter in the paper a resin-iron salts which will cause the paper to turn yellow in a short time. 2% oxide of iron should be the maximum in clay.

Calcium carbonate is the next thing to watch for. This particular article will raise the deuce with you for fair, namely producing foam plentifully and increasing your alum

*Paper read before the Northwestern New York Division of the American Pulp and Paper Mill Superintendents' Association, held in Watertown, N. Y., November 15.

Exploded View of C-H Clutch

The C-H Magnetic Clutch consists of but two parts, one of which carries the magnetic coils. There are no toggles, links, levers or similar parts.

The motor or other power unit may be brought up to speed before the mill line, pulp grinders or other machines are connected.

On a tissue paper machine drive a 30-inch C-H Magnetic Clutch was installed on the floor below with control switch above. Depreciation on felts was greatly reduced and as a result all machines of this mill are equipped with these clutches.

This C-H Magnetic Clutch Acts as Traffic Cop

In the mill of the Neenah Paper Company speeding up of the mill drive was experienced when the mill load was suddenly reduced or removed. The water wheel and the generator would over-speed.

Stops Over-speeding

To stop this over-speeding a C-H Magnetic Clutch was installed, electrically connected with a centrifugal governor. As a result, the clutch is automatically thrown out of engagement when the speed increases over a pre-determined value.

The small space required by the C-H Clutch makes installation a simple matter. Engagement and dis-engagement are also controlled by push buttons or wall switch stations located wherever desired.

There is no grabbing of the load, the inherent characteristics causing a smooth accelerating action.

Complete information relating to the use of C-H Clutches on any of your drives will be gladly furnished on receipt of data from you.
Ask for our publication 2030.

THE CUTLER-HAMMER MFG. CO.
Magnet and Clutch Department
Works: MILWAUKEE *and* NEW YORK
Offices and Agents in Principal Cities
Northern Electric Co., Ltd., Can.

C-H **MAGNETIC CLUTCHES**

Rigidity

is the main requisite in the construction of a Cylinder Mould.

On this depends the levelness of the sheet and the lift of the facing wires.

Let us describe our method of building these important parts of your machine.

Beloit Iron Works

BELOIT WISCONSIN

consumption sky high. You should not find over 4% calcium carbonate.

Now let us give the moisture some consideration. Very little attention have we given to that matter, but nevertheless we should. An experiment made by Mr. James Strachan, of England gave the following results:

A sample of absolutely dry china clay weighing 100 grms., exposed to an atmosphere with an average relative humidity of 88°, absorbed moisture as follows:

In 1½ hours, 0.35 grm. moisture.
In 3 hours, 0.5 grm. moisture.
In 23 hours, 0.74 grm. moisture.
And in 11 days, 1. grm. moisture.

The clay was exposed in a shallow tray and turned over every day. Clay has been found to contain as much as 12% moisture and as shown above, only regains, after drying on the paper-machine, 1% moisture, in this case a loss of 11% only through moisture would be suffered. In my opinion this is something to think about.

Loading agents reduce the strength of paper, hence when the paper must have a certain strength and filler has got to be used, a better fibrous stock must be employed, and more care used in the making of the paper.

The ink resistance is another thing impaired by the filler. In order to keep the proper sizing effect more rosin size must be used.

To enable you to determine the kinds of filler used from the ash of the paper, it is essential to know the chemical composition of the various fillers. As an example, the analysis of one sample of English and American clay may be given:

	English	American
Silica Si°_{2}	45.92	45.67
Alumina Al_2O_3	38.43	37.86
Ferric Oxide Fe_2O_3	0.71	1.48
Lime CaO	1.18	0.05
Magnesia MgO	0.21	0.01
Alkalis K_2O	0.78	0.80
Total water	12.77	13.22

The other loading agents named are: Gypsum, a natural calcium sulphate, $CaSO_4 \cdot 2H_2O$.

Pearl hardening is an artificial, hydrated calcium sulphate, made by percipitating a solution of calcium chloride with sodium sulphate. Two forms are known, flat tabular crystals or minute, needleshaped crystals.

Talc is a hydrated silicate of magnesium, which is prepared for the market by grinding the talc stones to fine powder, washing and screening.

Asbestine is nearly pure magnesium silicate (95-97%) extensively prepared in St. Lawrence County, N. Y.

Heavy spar is a natural occurring barium sulphate, $BaSO_4$.

Witherite is carbonate of barium, $BaCO_3$.

Neither of the two last named fillers are very good due to their high specific gravity.

Save-Alls*

By A. W. (DEL) NASON
Green Bay Foundry & Machine Works

A MACHINE manufacturer does not complete your machine when he sends it to your mill. Every condition is taken care of except that of recovery of loss—there is no practical save-all connected with any standard paper machine. The designers of Fourdrinier machines have installed, beneath the couch roll a "V" shaped box. This is supposed to be a save-all. All stock that is taken off the wire by the shower goes to this box—the entire tonnage of the machine also goes there during a break or a wash-up. The box has a valve in the bottom which the backtender is supposed to open and let the accumulated stock go down into the chest as soon as the break occurs. The only man that ever did this was fired because he didn't put the paper over the driers first. It is natural for a machine tender to want to get his sheet started before he attends to any minor details. We, who build save-alls, do not consider this a minor detail. There is also an accumulation of stock in the bottom of this box when the valve is closed. There is also a lot of water always overflowing from the box into the pit. This overflowing water carries fiber with it. You can't pay dividends with fiber that is in the pit or in the sewer or in the river. Nine machine tenders out of ten will tell you that there is no stock in this overflow water. If you have no save-all in your mill it will interest you to put a piece of old machine wire across the pit to catch this overflow. It usually runs from five to ten minutes before it is so full of stock that the water won't go

*Paper read before the Northwestern New York Division of the American Pulp and Paper Mill Superintendents' Association, held in Watertown, N. Y., November 15.

TRADE CAMACHINE MARK

We build

Slitters and Roll-Winders
Winders and Rewinders

What is more, we build each machine specially for the specific work it is to accomplish.

Advise us as to what your requirements are and we will send you all the information and details and by a thirty-day free trial of the machine in your plant demonstrate what a vital factor it is in saving labor-cost and waste in its operation on all kinds and grades of paper, whether in

Slitting and Roll-Winding
Winding or Rewinding

Cameron Machine Co.
61 Poplar Street **Brooklyn, N. Y.**

TRADE CAMACHINE MARK

"Progressive Combustion"

Stops Clinker Trouble

Green Chain Grate Stokers operate on the principle of "Progressive Combustion." The fuel bed remains undisturbed during the entire process of combustion.

Operators of Green Chain Grate Stokers do not have to worry when burning clinkering coals for fear of shut downs. Their job is not made a man killing job, jabbing, pulling and straining to remove the clinkers formed.

Users of Green Chain Grate Stokers can burn high ash content and clinkering coals as easily and efficiently as non-clinkering coals. This gives a much wider coal market.

We will be glad to give you further information. Write Department R.

GREEN ENGINEERING COMPANY
170 Kennedy Avenue East Chicago, Indiana

INTERNATIONAL COMBUSTION ENGINEERING CORPORATION

Green Chain Grates

CAST-IRON HOPPERS
SEALFLEX ARCHES
PRESSURE WATERBACKS
FUEL RETARDERS

through it any more. Some mills have save-alls installations for this place alone and make a lot of money out of them. But that is only a half-way measure as there remains a great deal of loss in the rest of the white water. So much for losses on Fourdrinier machines.

The chief losses on cylinder machines are of course, as in the case of the Fourdrinier, in the breaks and the wash-ups. Leaky collars on the cylinders, and the short stock that goes through the cylinder wires is another prolific source of loss. The Sutherland Paper Co. of Kalamazoo specified, when they ordered their paper machine, a save-all of a well known make. When they started up they noticed that their return from the save-all was excessive—way too high for normal operation. They put over an extensive investigation. They found that one of the wooden vats, which had been left in the weather while it was awaiting installation, had developed a crack in it somewhat less than an eighth of an inch wide. They calked this crack and at once their return became normal—about 3% to 5% of their daily tonnage. The same thing holds good in a pulp mill—the same overflow losses that are obvious, the same unseen losses that tend to shoot away perfectly good profit unless they are corrected—and to correct them you have got to know that they are there. They have a save-all installed at the Wausau Paper Mills, Brokaw, Wis., hooked up to four wet machines on sulphite. Their return amounts normally to about 5 boxes of stock per day. One morning the reports showed 7 boxes. This continued for a week without lessening any. On investigation they found that one old time wet machine had developed a small leak between the inner and outer divisions. They plugged this with a rag and the returns became normal. In both of these cases and that of the Sutherland Paper Co. the leaks were no one's fault, and yet, if there hadn't been a save-all installed in each case as a tell-tale they would have had losses. In the case of the paper mill the loss would have amounted to $1,200.00 per month—which will pay dividends on quite a lot of stock. The point is that a save-all will tell you things about your operation that you can find out in no other way—things that you want to know.

Types of Save-Alls

There are quite a number of Save-alls in general use. We make one which we think is good. There are other good ones. The poorest one, if given a chance will pay for itself in a very short time. The earliest type that we know anything of, is the inclined screen, or side-hill save-all. This machine is doubtless familiar to all of you. It consists of closely meshed wire mounted on a wooden frame and set at an angle of from 45 to 60 degrees. The white water from the mill is allowed to run over this device. The water goes through and the stock accumulates at the bottom of the screen. The serious objection to this type lies in the fact that the wire fills up very rapidly, especially where alum, size or clay has been used in the furnish. Unless the wires are kept clean the entire white water passes over it, and thence into the sewer. The constant cleaning of the wires cost time—and money.

The next development is the cone-shaped revolving save-all. This is more efficient than the inclined screen, as there is a shower attached and the cleaning problem is simplified. However, because of its length, there develops a lot of vibration and that, coupled with the horizontal strain, makes it a difficult machine to keep wires on. The capacity of this machine is also comparatively limited and when a rush of stock comes from a break or wash-up, the machine fails to function and the stock goes down the creek. You will notice on inspection of one of these machines, a great deal of broken wire—and broken wires mean lost fiber.

The next type is the couch roll decker. This is a more efficient device than the cone. But its capacity is comparatively small and it takes a lot of them to handle a rush. Also it is a wire hog as the revolving of the couch against the wire causes unusual wear.

There are several modern patented save-alls being marketed at present I believe that there is at least one of each in the Watertown district. Each has its advocates in modern practice. Each has its weakness. At the risk of being accused of trying to sell my own machine I shall try to describe them briefly.

The first is a rather elaborate installation, but from the angle of recovery, is a very good save-all. A felt is passed around a cylinder and the white water is forced through it. The recovered stock is taken off the felt by a rubber couch on which there is a doctor. The life of the felt is from sixty to ninety days. The machine resembles a large wet machine and takes from 7 to 10 horse power to operate. The best installation of this machine that I have seen is in the Munising Paper Co., of Munising, Michigan, where they have four

Cleveland
WORM GEAR REDUCTION UNITS

Cleveland Worm Gear Reduction Unit applied to revolving screen Motor 25 h.p. at 880 r.p.m. Ratio in worm drive 7½ to 1.

Do users have any trouble with Cleveland Worm Gearing?

The short, quick answer is NO. And that's the unanimous answer of users.

Of course, you expect us to say that, because we are interested in selling Cleveland Worm Gears. Therefore, you are prepared to discount that statement.

But we don't ask you to take our word for it.

But note this. Our largest volume of business year after year comes not from new customers but from old customers. Seventy-five per cent of 1921 business was from old customers—users of our drives. Seventy-eight per cent of 1920 business was from former customers.

Think over these facts and analyze them to the limit. Then let us name some of our users if you will. Check us up!

Do you realize that speed **reduction**—proper speed reduction is today one of the big elements in factory efficiency?

Can you imagine what substantial, permanent savings could be effected in your plant by the adoption of this simple, efficient drive? Note: There are only two moving parts exclusive of bearings—the worm and the gear running in an enclosed bath of oil.

Remember, we don't ask you to throw out something that has **proved** itself useful and scrap it simply because we say we have something better. We suggest that you take the first vacancy in the speed reduction row and give a Cleveland Worm Gear Reduction Unit a chance to fill the job.

Let its operation and service tell you its story. We know now that its story will be a story of complete satisfaction, high efficiency and "No Trouble."

The Cleveland Worm & Gear Co.

America's Worm Gear Specialists

CLEVELAND, OHIO

DRAVO-DOYLE CO., Pittsburgh
Cleveland, Indianapolis, Philadelphia

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THE VULCAN IRON WORKS CO., Denver, Colo.

"Yes, One of these NIAGARA BEATERS replaces three Holland type engines. We saved $9,000 in our beater room last year as a result. We're proud of our NIAGARAS."

NIAGARA BEATERS

Fulfill the Most Important Desires of Paper Mill Men

1. Because of their Practicability and Merit. They increase production, lower costs, save floor space, power, labor and time.

2. Because they are substantial, attractive pieces of equipment. Their impressive appearance cannot help but arouse a feeling of confidence and pride. The NIAGARA BEATER is an engine always shown to visitors.

"Ask the mill that owns one"

Valley Iron Works Co.

Plant: Appleton, Wisconsin

New York Office: 350 Madison Ave.

of these machines taking care of the white water from two machines making 50 tons of sulphite bond per day.

The second machine is of the couch roll style. An inside shower blows the stock off into a small box that is connected with a pump that returns the stock wet into a receptacle where it can be used. It takes about 7 H. P. to operate this machine. It delivers the stock about 1½% dry. It is difficult to check up exactly what your loss is and what your recovery is and no tell-tale of excess loss is present, owing to the extreme wetness of the stock.

The third type of save-all is both a popular and efficient machine. This picks up the stock on the outside of a revolving cylinder and uses air from a blast to dislodge it. The best operation of this machine is when losses are heavy so that a thick coating—enough to offer resistance to the blast—is present in the cylinder. When the losses are light as they are under normal running conditions, the resistance to it lessens and the stock comes off very wet. Air of course hasn't the liquefying properties of water and will not convey the small particles as water will. This machine together with the air compressor takes from 5 to 7 H. P. to operate.

The fourth type of machine is one which operates on the principle of the cone save-all with some of the trouble cured. The revolving member is a cylinder instead of a cone. The machine takes the white water on the inside of the cylinder, which is closed at both ends. The cylinder is covered with a fine meshed wire and backed by one of coarser mesh. Anything that gets into the cylinder, which cannot get through the filtration wires is saved. The water passes through the filtration wires. The pulp is deposited on the inner surface of the wire. As the cylinder revolves the stock at the top falls off into a "V" shaped trough. Along the bottom of the trough runs a common screw conveyor. The trough is pitched a little up-hill toward the discharge end of the machine. In the process of being conveyed up-hill the stock loses still more water through the holes in the bottom of the trough. The stock is delivered from 3½% to 5% dry. A small shower can be put into service wetting up the stock so that it can be pumped if desired. The power used to operate this machine is that which is required to turn the cylinder over—about 1 H. P. The wires are put on this machine in 14¾-inch strips.

The above list comprises the more important stock machines used in present practice. There are a number of specially designed installations which shoot at the dubious mark of 100% recovery. One of our men called at a mill the other day in one of your sister states. He had heard that there was a 100% save-all there. Naturally he wanted to see it. He hunted up the super and asked him if he had such an installation. He had, but he, personally, didn't buy it. Did it recover 100%? It did. What was the type? It was built on a settling tank principle and all the waste water was clean water, free from all solids. "Let's see it run." It wasn't running. "Let's see some of the recovered stock." There wasn't any. Why not? And then the super broke loose. This thing cost $10,000.00 for a 25-ton paper machine. It saved all the solids—all the grease, all the dirt, all the other useless stuff that collects around a paper machine as well as the pulp. So when we take the pulp out we throw it back into the river. The boss knows that he has been stung but he don't like to talk about it. The filtration system, whether it be mine or that of a competitor, will allow the undesirable slime and grease and dirt to go down the river, and in actual practice the recovered stock is cleaner than it was when it first went into your beaters. We know of one Ohio mill which is installing now a series of settling tanks which looks like a cross between a silo tank and a digester house. This is costing between $50,000.00 and $75,000.00. How they are going to get rid of the objectionable elements without still another handling we do not know. But we are interested.

The Economies of Save-Alls

The reclaiming of hitherto waste material is only one chapter in the great struggle for operating efficiency which so dominates industry in all its branches today. A successful "farming of the fence corners" may spell the difference between profitable operation and competitive pricing on the one hand and bankruptcy on the other. The save-all business is only in its infancy. None of them have as yet devised a fool proof save-all. Nor one that will run without lubrication, nor one that will screen stock with broken wires, nor one designed to handle a half million gallons per day that will function successfully when a million and a half gallons are dumped on it, nor one whose filtering properties are destroyed by filled up wires or shower pipes that are only operating 50%. A save-all properly installed not overloaded and given a little attention will return to you in good convertible pulp from $15.00 to $50.00 per day.

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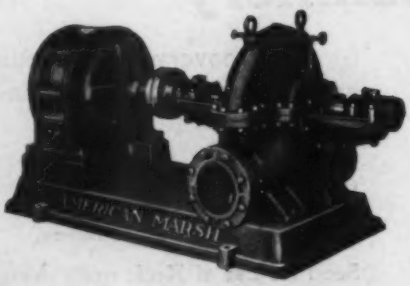

ESPECIALLY adapted for paper mill service where absolute reliability and high efficiency are required. There is an American-Marsh pump for every paper mill requirement, from draining the rolls on the dryers to handling heavy paper pulp stock.

Because of the fact that the factory is located in the heart of the largest paper mill district in the world, we have always made a specialty of paper mill pumps and our designs are the result of careful first hand study of the actual requirements.

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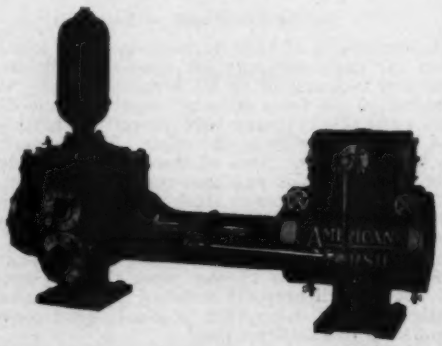

May we send you our general catalog?

American Steam Pump Company

Battle Creek, Michigan

delivers to you and a bunch of varied employees your bread and butter and an occasional helping of cake. You keep your showers clean. You replace your felts and wires when they need it—and if they need it too often the felt man or the wire man catches hell. You keep it oiled and adjusted and wet nursed along and what would be called trouble to a save-all man is only an "ordinary operating problem" in your big machine. Your paper machine produces for you a certain number of tons per day—and no more. Your wet machine makes a certain number of laps per day—feed it more and watch it buck.

The purpose of this paper lies in just one direction. It is solely to attempt to impress on you the value of some sort of save-all or recovery device and second that your installation be made on more or less sound lines. That is, that you know what you are buying. If you need two machines, whether they be North machines, Bird machines or Improved machines, don't buy one to save a couple thousand dollars, because if you do a couple of thousand dollars is all you will save—you won't save any pulp to speak of. I saw a six foot save-all in this district the other day over in the corner with a dunce cap on. It was a machine, capable of perhaps 300,000 gallons. It had been hooked up to a 45-ton news machine over which passed an estimated 1,500,000 gallons per day. Do you wonder that it failed to work? I didn't, but the man who bought it did. On the other hand I saw a machine of similar make operating in a nearby mill handling the white water from two machines which make about 20 tons of paper per day. The entire reclamation for four months had been piled up beside the machine and showed about forty tons of stock that didn't go down the river. Almost a half a ton per day.

The value of a save-all lies in the stock it saves for conversion, plus the information it gives you when a leak starts, minus the operating expense—the H. P. and the superintendent. The simpler a machine is the fewer the moving parts, the less difficulty you are apt to have with it—provided none of its efficiency is sacrificed to simplicity.

Mill Management Problems*

By R. B. WOLF
R. B. Wolf Company, New York City

IN order to get before you some of our recent experiences in mill management work, I am going to give you this afternoon some concrete results we have obtained by the development of cost methods.

In one plant, during the past year and a half, we have succeeded in reducing the cost of maintenance materials over two dollars a ton on the entire production. The way in which this was accomplished was by establishing cost keeping methods which aroused interest in lowering the costs of production. When we took over the management of the plant, we found that, in common with a good many mills, there was no real store keeping system which enabled materials going out of stock to be charged direct to the point where they were used.

The first thing, of course, that was necessary was the complete reorganization of the Stores Department. Getting our materials all under cover and running a perpetual inventory made it possible to charge direct to the particular maintenance jobs the materials as they were used, putting into the hands of the foreman of the maintenance crew the exact cost of the work that he was doing.

At first, as you can well imagine, there was considerable kicking about not being able to go in and help themselves to anything they wanted at any time. However, that didn't last very long, because the real interest in having knowledge of costs offset that apparent inconvenience at the start.

The next thing we set up was a card system (it doesn't have to be a card system, but we used cards for convenience) which gave the cost of maintaining each piece of apparatus in the plant. I remember hearing a discussion one day between the general superintendent and the superintendent of the sulphite mill to the effect that the pump which was supplying the digesters with acid was costing one hundred dollars a month to keep in repair, largely because of troubles with the drive and counter shaft and various things. The general superintendent said, "How do you know it is costing that?" "I don't know, but I am pretty darned sure it does." The card showing the cost of maintaining that piece of apparatus disclosed the fact that it cost one hundred and seventy-five dollars a month to maintain that equipment. Of course, it didn't take very long to change it and move that particular piece of apparatus out of the position it was in and replace it with another that cost less than ten

*Address delivered before the meeting of the American Pulp and Paper Mill Superintendents' Association, Connecticut Valley Division, held at Holyoke, November 18.

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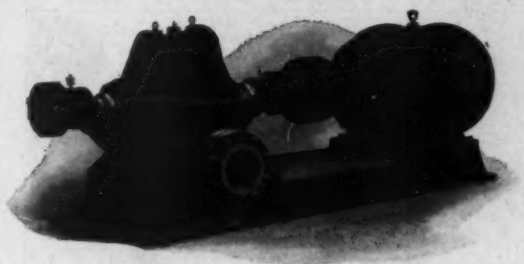

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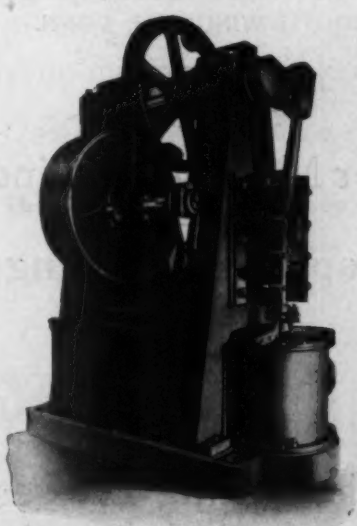

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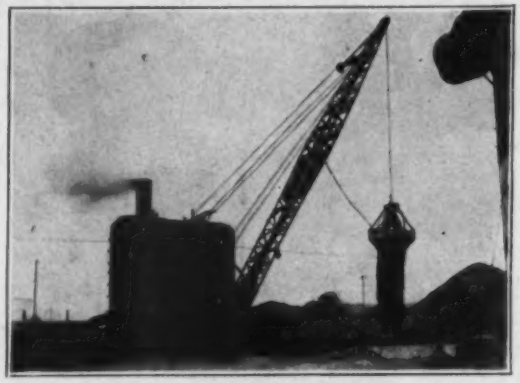

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This "Industrial" is saving this firm more than $13,000 per year. It also has time to do other work, such as a grading job, where the dirt was so full of slag that handling with shovels was almost impossible. To quote Mr. Hart again: "The Crane kept nine wagons busy making three trips an hour to a point four blocks away, and easily completed the job within the time desired.

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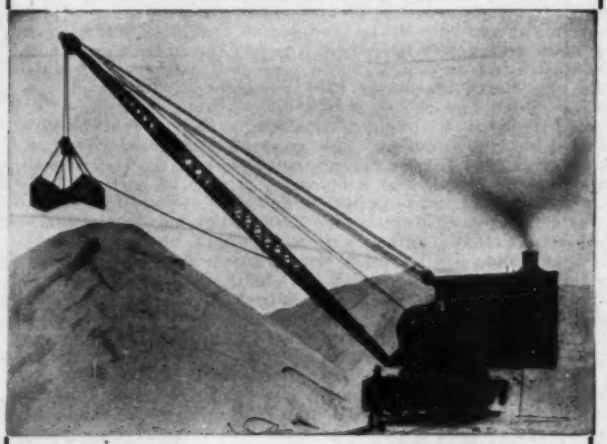

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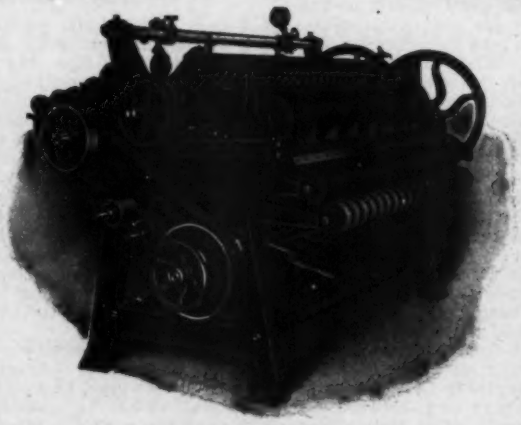

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dollars a month to maintain. There are a great many instances of this kind that I could cite to you, but I think they are unnecessary.

I will, however, mention one other, in another mill, that of a conveyor for conveying the wood room refuse to the boiler house. This conveyor was costing, including delays occasioned by shutdowns, approximately twenty-five thousand dollars a year to maintain. It broke down on an average once every two hours and had to be repaired. It had been done for so long that it began to be looked upon as a regular part of the operations, and, of course, when we began to figure the cost it didn't take long to replace it with something that cost very little to maintain and didn't interfere with operating conditions.

Now I want to keep these classifications of costs separately as I go along. First, the cost of the job which the foreman, doing the work under the master mechanic, was responsible for, and, second, the cost of the apparatus itself, so that the department head (or the superintendent, if the plant is small) could come to the general superintendent and say "I would like to have this piece of apparatus changed because it is costing us so much to maintain; it is delaying us and if we replace it with something else we will get better results; and give him the analysis and knowledge necessary to convince the general superintendent that he is right about it.

The next grouping of costs is by departments. We find that there is a keen interest in the department operating costs. For instance, in the wood room the cost of making chips per cord is of very great interest to the wood room foreman. He is not interested in the lowering of costs, of course, unless he knows what his past costs have been, and just in proportion as you can give to the operating foreman definite records of economy of operation is he interested in lowering his costs.

Reducing Maintenance Cost of Materials

I guess perhaps some of you men have heard me tell about the actual economies affected in one of the mills I managed, but to refresh your memory I want to make this statement: that within twelve months from the time we began keeping these records, or when this method first originated, we lowered the maintenance cost of materials two dollars a ton. As this plant manufactures 130,000 tons a year, the saving is $260,000.

When I tell you that we were not able to get these costs down until we got the operating department heads interested in the economy of operation, I am telling you exactly what the situation was. The superintendent, myself and the chief engineer, were constantly urging and pushing the department heads (nagging them, if you please) to be more economical in the use of materials, but not knowing the economy with which their departments were running, what we said to them didn't make much impression. However, just as soon as we began to put into their hands actual departmental cost sheets, which, for instance, gave the man in charge of acid making the cost of making his acid per ton, the man in charge of the boiler house the cost of making steam per one thousand pounds, and the man in the wood room the cost of making chips per cord, immediately we began to get a keen interest in the lowering of costs.

I remember that shortly after we got these departmental cost sheets going the keen interest that was aroused reflected itself first upon the chief engineer of the plant. He came in to me one day and said: "Mr. Wolf, these damn department heads won't leave me alone." I said, "What is the matter," and he replied, "I had some men over at the log pond bringing in some press rolls and Joe said they are a bunch of loafers and asked me to send over some good men."

The result was that all through the plant the operating department heads, being interested in costs, would keep the master mechanic and chief engineer informed as to poor economy and operation.

The job costs followed naturally because when the man in charge of the department found fault with the foreman who was doing the work, the foreman not knowing what the costs were logically went to the master mechanic and said "We don't know what it costs to do the job; why can't we have some information?" And, as a result, we developed individual job costs.

Now, when I tell you we had men come to the mill with little scales in their tool boxes to weigh the bolts, nuts, screws and gaskets that were delivered by the storehouse, anything that was delivered on a pound basis, so as to make sure that the storehouse wasn't beating them, you will see what a tremendous interest there was in keeping costs down.

There was no bonus system. We did not pay for piece

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The same fine quality that is found in all material handling machinery bearing the Brownhoist mark is maintained in these new products. We now solicit your inquiries on

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Makers of Rubber Covered Rolls

Maximum Resiliency WITH Minimum Softness

Long Life

work and nobody got any more out of it except the satisfaction of doing a good piece of work. Of course, the net result was tremendously more efficient operating conditions in the plant and wages went up; but they went up by the hour and the day and not because of any system of paying a man more because he did a good piece of work.

At the Pejepscot plant a cost keeping system has been developed whereby the manager sits down at the beginning of each month, or just before the beginning of each month, and with the superintendent of each of their three mills figures what the costs should be. In other words, a prophecy is made and that prophecy naturally can be made to better advantage because of the accumulation of knowledge we have of costs. Then each week an exact cost sheet is furnished with all the items in it to the Superintendents and that is compared with the ideal cost.

The Cost Engineer told me the last time I was up there that he had to keep away from one mill in particular because they always wanted a lot more costs started, and he was so far behind he didn't go near there.

Interest in Cost Reduction Creates Other Interests

Now, if you get a lot of individuals interested in lowering costs, the result is going to be an interest in other things beside costs. In other words, when the costs go up the man wants to know why they have gone up, and he begins to inquire. For instance, if the cost has gone up in the boiler house he inquires the reason for it, and of course, this means that an answer has to be given. Is the quality of coal as it should be? Is the coal coming in with so much moisture that you are losing out on the fuel value? Is the coal being burnt properly, or are there holes in the fire?

Immediately the answer is to install a recording gauge which measures the output of the steam boiler. When there is a hole in the fire the flow of steam is interrupted, of course, and a gauge on the boiler, which instantly reflects the output of the boiler, is going to be a very valuable thing; also CO_2 instruments for measuring the carbonic acid in the flue gases are of value. These are of tremendous help to the firm. Finally, meters for metering the water that goes into the boilers and metering the coal that goes in. In that way definite information is reflected back to the fireman and the man in charge of just how much water he is evaporating for every pound of coal that he uses.

Now, ordinarily putting instruments like that into a plant doesn't meet with very keen response, but if you first put into the hands of the superintendent and the foreman the cost of operating his department, instead of being more or less indifferent to the use of these things which seem to be overly scientific, he begins to insist upon having some information; and that has been our experience.

Take the item of belts. All of you men will at once recognize the difficulties we have had and which you would like to see overcome yourselves, perhaps, of stopping a man from putting belt dressing on a belt. We used to take the belt dressing away, but there was always rosin and oil around the plant. I used it myself. If a belt was slipping the operator was a lot more interested in stopping the slip than he was in the fact that a new belt had to be put on the drive perhaps once a month. Now, when that belt is being charged in a departmental cost sheet against that department it doesn't take long for the operator to come to the Engineering Department and say: "You fellows get on the job. I am paying fifty dollars every thirty days to have new belts put upon that blooming drive. Now it isn't running fast enough, the pulleys are too small, or it ought to be wider." The result is that by pressure from the operating man the Engineering Department goes down and investigates the situation and corrects it.

Concretely, that sort of method applied in one of the plants referred to reduced the cost of belts from twenty-two cents a ton to three and one-half cents a ton over a period of four years.

Reducing Felt Costs

Take the felt costs on wet machines. There are a great many things that will run these felt costs high. Probably the roll doesn't drop down in the vat sufficiently to give a proper couching effect on the cylinder, or it may be that the rolls on the wet machine or on the paper machine are all covered with barnacles and are cutting the felts. There are many things that will keep your felt costs up; but when the man has reflected to him every month the actual cost of felts per ton, he takes an interest and lowers the cost.

I remember one plant where I proposed that the felt costs be given to the man on the machines. The manager held up his hands in horror. "Why," he said, "every blooming felt concern will come in and know what his felt costs are." My

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Boilers: Watertube, 250-750 H. P.
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All in finest condition, being removed from the 305 wooden steamships recently purchased from the U. S. Shipping Board. Some of the ships never went overseas. Prices are so low they will surprise you.

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A man's sense of touch, like his appetite and general condition, varies from day to day.

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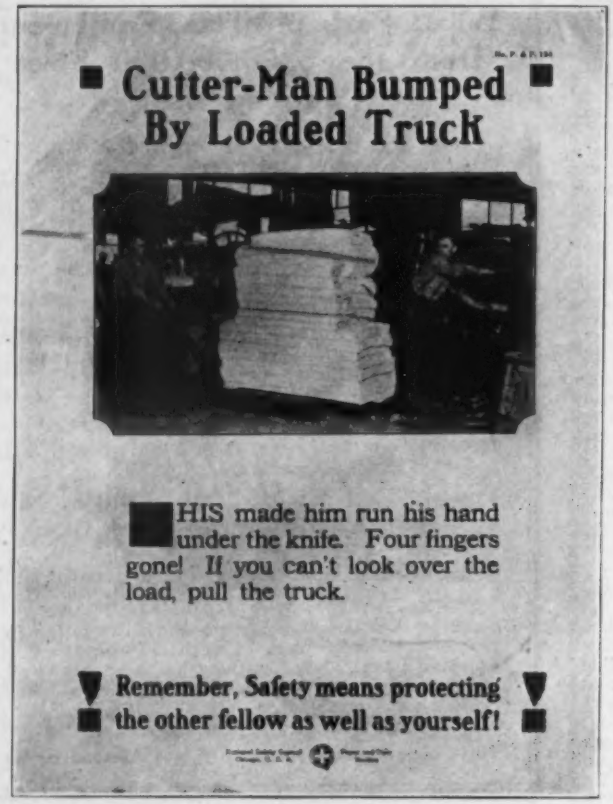
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THIS made him run his hand under the knife. Four fingers gone! If you can't look over the load, pull the truck.
Remember, Safety means protecting the other fellow as well as yourself!

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OUR SAFETY BULLETINS attract the workers' attention, and hold their interest. No highbrow stuff—they don't shoot over the heads of the workmen! Simple, yet full of human interest, they put the safety message across in a way that sticks! Results? They have helped many of the Council's members in the Paper and Pulp Industry to reduce accidents 75 per cent or more because they instruct, they stimulate safety thinking, and they develop the safety habit among the men.

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reply was, "The more, the merrier. Let him know what the costs are. Give them to him."

I had one very definite experience where a felt manufacturer, who today is making what I consider the best pulp felt in the country, had the poorest record on felts. That fellow sent a man to our plant to study our conditions. He stayed there several days, went away and came back again, and he finally developed a felt which met our conditions and gave better results than anybody else. If that isn't economy and doesn't reflect in lower costs, if it doesn't pay to do that, I am mistaken.

Take lubrication. You know how hard you have to preach to the fellow who is doing the oiling up not to put half of it on the floor. If you will give to the department heads the cost of lubricating their department, you will find out pretty soon that they will come to you, as they did, for instance, in one case, and say: "I would like to know what it costs to lubricate the top drives and I would like to know what it costs to lubricate the bottom drives of the machine." We finally had to segregate these costs in such a way that before we got through we had cut the lubricating cost of that man's department two-thirds and reduced the total oil bill two thousand dollars for the entire plant.

Now that was due to the fact that there was interest in lowering costs. I could go on and enumerate a great many things of that kind, but it isn't necessary to give you any more illustrations.

I am only just urging that if you are fortunate enough in the plant you are connected with to have a cost keeping department that recognizes the fact that the main job of the cost-keeping department is not to give information to the management to give somebody hell, but looks upon the problem as giving information to the fellow who is doing the job, so that he can give that little hell to himself, why welcome that kind of a cost-keeping system.

Keeping Up the Interest

The point I want to emphasize mainly is this: that after you get the men aroused to a desire to do better work the main job is to keep up that interest.

Perhaps some of you men have been in mills where the foremanship course has been developed. I know that in one or two cases a lot of interest has been aroused in developing a line of logic and reasoning, which stimulates the foreman to think—I mean a little differently—about problems and analyze them. But the main trouble seems to be the follow-up, to keep that interest up after the thing has once gotten to a certain point.

Now, the more mills that develop definite records of cost of wires, felts, lubrication and repairs, and put those costs into the hands of the men who really have something to do about them—the more mills that develop along those lines the less trouble there is going to be in keeping up that desire for better results.

Now that gets back to a certain human characteristic that I am not going to dwell on at length, but merely want to emphasize, which is the basis of this keeping up of interest. It is impossible for an operating man to keep an interest in future economies of production unless somehow or other you can keep always before that man a definite record of his past quantity and quality and cost of production. You know what I mean, when you go back and compare it with some of the contacts you have had with men in your mills.

I say that if a machine tender or back tender, or a cook, when you ask him about certain conditions, reaches into his pocket and pulls out a note book and tells you what he did at the other mill, what the acid was or the cooking temperature or that this particular felt ought to last better because at the last plant where he was with the same width felt or perhaps a felt only a foot longer he got better results; or at another plant where he had perhaps a one hundred inch or ninety-five inch wire he got better results than here; and he begins to tell you that he has observed in this particular mill that the table rolls were six inches in diameter and didn't have any wobble to them, instead of four inches, where there was a constant throw like this (indicating), you have got a good man and you make a mental reservation, "There is a fellow I am going to promote the first chance I get."

In other words, that fellow has done the natural human thing which all human beings want to do, and that is accumulate records of his past performance. Now there is only one reason for accumulating records. Perhaps you haven't thought of it just this way, but the reason for accumulating records is so that you can profit by that past experience, and the reason you put it down in a note book is because it is pretty hard to remember a whole lot of things unless you accumulate them in some sort of a form which you can refer to.

Now the man who has accumulated the largest number of

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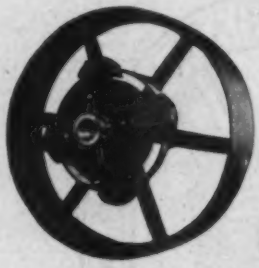

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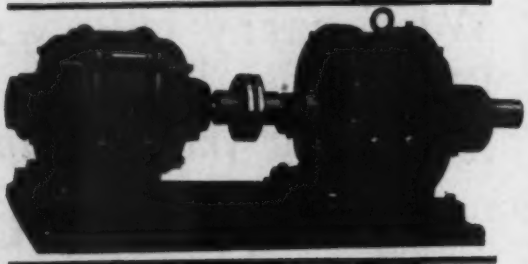

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records of his past performance is the man who has the greatest possible vision of what the future possibilities can be. He is the fellow who sees further ahead. A lot of our men that we call idealists (and I am talking of ideal superintendents and ideal operators, too) are the fellows who somehow or other have the power of visualizing or looking back at the past, as it were, and letting that past be the guide to the future.

Now it is just as impossible for a machine tender or a back tender, or a grinderman to visualize or get any idea of what the future possibilities are if he hasn't a record of the past, as it is for the manager to think in terms of economy if he has no cost sheet which gives him a chance to know how economically he is operating.

During the war I was with the Emergency Fleet Corporation. The shipyards developed so rapidly that it was impossible to get ship builders fast enough to take charge of the yards or to work in the plants. Before the war the total tonnage of ships built, the highest tonnage in any one year was 240,000 tons, as I remember it. That went up to 7,000,000 tons. You remember the barbers, doctors and lawyers and everybody else had to be pressed into service.

In these shipyards the manufacturing proceeded faster than the cost records and there was the wildest extravagance in manufacturing because nobody knew what costs were. The costs hadn't kept up or hadn't caught up to the actual manufacturing conditions, and, in yard after yard after the cost systems got into operation, I saw things tighten up and the operators, the managers and the superintendents began to think of the possibilities of getting the cost per ton down. They took an interest in the future possibilities of lower costs when they had records of the past. You can't take an interest in the future until you have that.

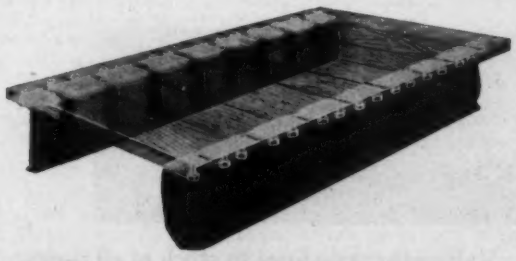
Now, that sort of thing is, I think personally, the biggest problem that confronts the management today. I don't think there is any way to change the inefficient practices, the inefficient methods except by informing men who are responsible. This should be given to the individual machine tender, give him the information of the actual economy with which he performs, the actual quality of the paper produced, so that he can tell what his past quality has been and therefore be able to take an interest in his future and the actual quantity of production.

In other words, it boils down to keeping intelligent records, and it boils down in the last analysis to having the manager of the plants, those who have really the power to do these things, to get the superintendents and get the foremen together and talk over ways and means of giving them information and knowledge, and it is perfectly astonishing the tremendous interest that will be taken in a very short space of time.

New Platform for Paper Handling

The Barrett-Cravens Company of Chicago has designed a platform for the handling of paper. The feature of this platform is a combination of the advantages of both the all-wood and the all-steel platforms.

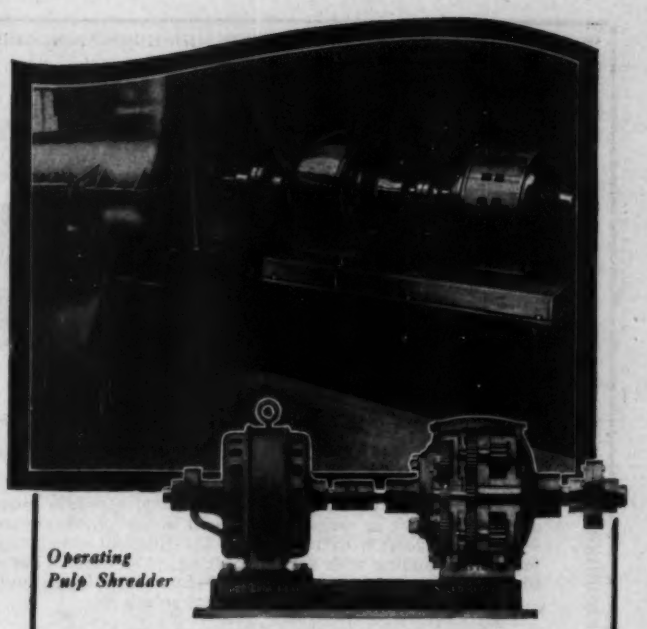
The legs are built of steel and are bolted to the wooden top



in a way to give absolute rigidity and yet afford a smooth wood surface on which to lay the paper.

The accompanying illustration shows the construction of this new improved platform.

In regard to the tremendous quantities of paper which are used in Chicago it is interesting to note that the production of one print shop alone uses annually 47,965,000 pounds of white paper. Another company prints 3,000,000 mail order catalogues a month, some of them weighing one pound. It also prints the same number of fiction magazines, using 250 tons of paper every day when working full force, as at present.



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Glens Falls Will Prosecute Infringements

The Glens Falls Machine Works, Glens Falls, N. Y., manufacturers of a well known line of pulp and paper making machinery, announce that certain patents owned and controlled solely by them have been infringed, and are creditably informed, they say, that these are now being infringed.

The patents referred to cover their Rogers Wet Machine, A. D. Wood Machine, Glens Falls Rotary Sulphur Burner and Wells Knot & Silver Screen.

They state that one manufacturer built and sold nine Rogers Wet Machines, infringing their patents, and for which purchasers paid the Glens Falls firm very substantial sums as damages.

They go on to say that while it may be expected that the unscrupulous might attempt such action, they propose to use any and all means necessary to stop the nefarious practice, and all infringements, whether by manufacturer or user, will be vigorously prosecuted.

Noble and Wood Issue New Catalog

A handsome, cloth bound, 230 page book has been published in which is described a complete line of paper mill machinery manufactured by The Noble and Wood Machine Company, Hoosick Falls, N. Y.

Not alone are the various items of paper mill equipment clearly and concisely described but nearly every piece is visualized with clean, outlined photographic illustrations. In many cases mechanical drawings are shown to more clearly depict details. In the arrangement of this book, utility to the paper mill man has been an aim of the authors.

Obituaries

Peter J. Schweitzer

Peter J. Schweitzer, widely known as a manufacturer and importer of cigarette paper, died at Mount Sinai Hospital in New York on November 27 of appendicitis. Mr. Schweitzer owned several paper mills in France, which manufactured almost exclusively cigarette paper for the United States market, and he had recently established a factory for the same purpose in Jersey City, N. J. His home in New York was at 270 West End avenue. A widow and five children survive him.

Mr. Schweitzer was internationally known in Jewish and Zionist circles, and was reputed to have been the largest single contributor to the cause of Zionism and allied interests, having given in all $400,000 to this cause since 1907. During his visit with his wife last year to Palestine he laid the foundation for a hospital in Tiberias, to which he donated $50,000. He was born in Balta, Russia, in 1874, educated in Odessa and at the Sorbonne in Paris, and came to the United States in 1905.

Chas. J. Tagliabaue

Charles J. Tagliabue, founder of the C. J. Tagliabue Manufacturing Company of Brooklyn, died November 2.

The Hawley Pulp and Paper Company of Oregon City, Ore., are making plans for the installation of a new, 90 tons a day, machine. The addition of this machine will necessitate the all around enlargement of their plant. W. P. Hawley recently outlined plans which would call for the expenditure of around $1,750,000. The company is at present making arrangements for an additional 1000 H. P. of water power. With the completion of the new addition it is approximated that the capacity of the plant will be 200 tons of paper daily, requiring about 900 employees to operate the entire plant.

Aaron Bagg, Jr.

Aaron Bagg, Jr., 83, died at his West Springfield, Mass., home the latter part of November. Mr. Bagg's death did not come suddenly. It was the result of a long period of failing health.

His father, Col. Aaron Bagg, was one of the founders of the Parson Paper Company of which Mr. Bagg, Jr., was president at the time of his death. Aside from his connection with the above mentioned paper mill he was a director of the Millers Falls Paper Company and of the Third National Bank of Springfield, a trustee of the Springfield Five Cents Savings Bank and of the Whiting Street Fund.

Frank B. Clark

Frank B. Clark, manager of the Naubuc Paper Company, died at his home in Glastonbury, Conn., November 5. Mr. Clark is survived by two daughters, Miss Maud B. and Miss Edith M., and a son, Frank B. Clark, Jr., who was associated with his father in the paper business.

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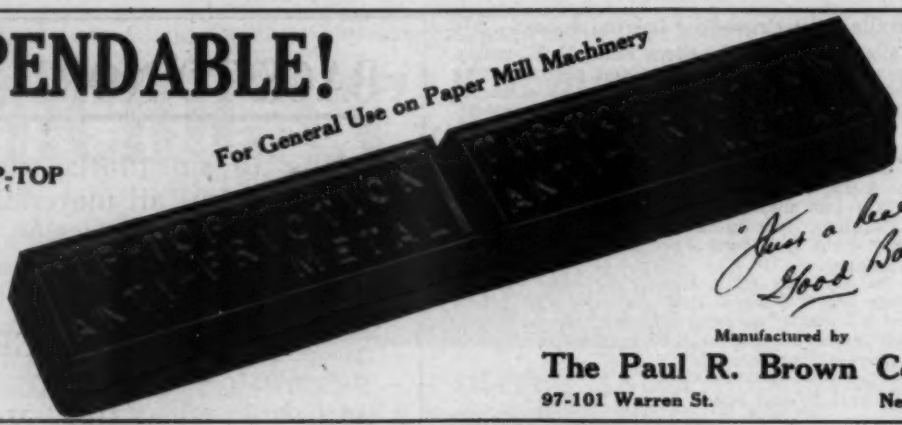

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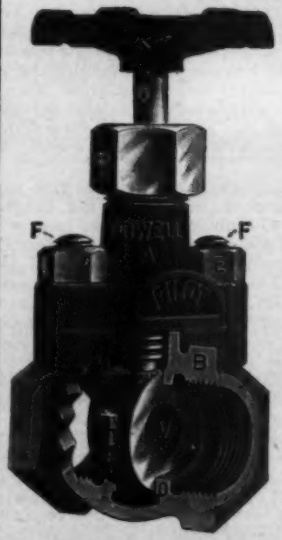

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Handbook of Quality Standards

A handbook of Quality-Standard Papers has been published by the American Writing Paper Company. This is a beautifully bound 400 page book with marginal indexes.

Aside from a discussion of the advantages of paper standardization this book treats in a very comprehensive manner practically all questions co-related to the standardization of paper. One section of the book is also given over to a brief, interesting, well illustrated description of how paper is made.

A splendid work of this nature is of vital interest to all interested in paper standardizations.

New Booklet on Forestry

"Impressions of European Forestry" is the title of an 80 page book prepared by Ralph S. Hosmer, M. F., Professor of Forestry at the Cornell University.

This work is the result of Mr. Hosmer's visit to numerous European countries during the year of 1921. There is scarcely one of its interesting pages that is not enlivened with beautiful photographic illustrations, adding not only to the interest value of the book, but presenting the situation as Mr. Hosmer found it, in a much more clear and concise manner than would otherwise be possible.

New Edition on Testing Methods

The third edition of "Paper Testing Methods" has just been issued, by the Technical Association of the Pulp and Paper Industry.

The methods of testing represented in this book are endorsed by the Technical Association and are suitable for use either by the manufacturer or by the consumer of paper as well as in commercial laboratories.

A committee whose work has been given gratis has prepared this work and it is selling at a price which barely covers actual cost of production.

The A. B. Massa Paper Corporation is the name of a new concern organized in New York to act as paper mill agents and to deal in all kinds of paper, paper board and twines. The company has established offices at 358 Fifth Avenue, New York. Members of the corporation operated for more than 13 years the paper and paper board department of the Gatti-McQuade Co., which recently discontinued business.

A building permit authorizing the construction of a $50,000 addition to the Oregon Paper Company of Salem, Oregon, was issued November 3 by Deputy City Recorder, Mark Poulsen. This addition will be a four story wing and will be equipped with new machinery.

New England

Boston, December 1, 1922.

The Beacon Oil Company of Boston, fuel oil handlers, and a subsidiary of the New England Coal and Coke Company, has been awarded $390,743 against the International Paper Company by Judge Peters in the United States district court at Boston. It was a jury verdict. The allegations of the complaining oil company were that by a contract entered into October 4, 1920, the International Paper Company agreed to purchase, and the Beacon Oil Company agreed to sell oil up to 550,000 barrels during 1921. Of this maximum 281,197 barrels were actually delivered in 1921 and with an extension clause in the contract, the oil company attempted to deliver the remaining number of barrels, which the paper company refused to accept. The oil was to be sold at $3.50 per barrel. Suit was brought for $1,000,000 damages. The International Paper Co., argued that the contract was misinterpreted by the oil concern and that a strike in the paper mills at Rumford and Livermore Falls, Me., together with poor business conditions prevented it from taking the remainder of the oil. The court directed that the conditions argued by the International be taken into consideration by the jury.

Boston Paper Trade Association Fall Meeting

The Boston Paper Trade Association enjoyed a sumptuous dinner and a most interesting and entertaining evening at their annual fall meeting at the Exchange Club, Boston, on Wednesday, November 15. The speaker of the evening was the Rev. George Adam of Montreal, a member of Lloyd George's personal staff during the war. Mr. Adam spoke from intimate personal knowledge of the "Little Welshman" and his talk giving, as it did, such a close and accurate sidelight on the ex-prime minister, together with the sparkling

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You will probably agree that without indicating and recording instruments of some kind your plant would be like a ship without a compass.

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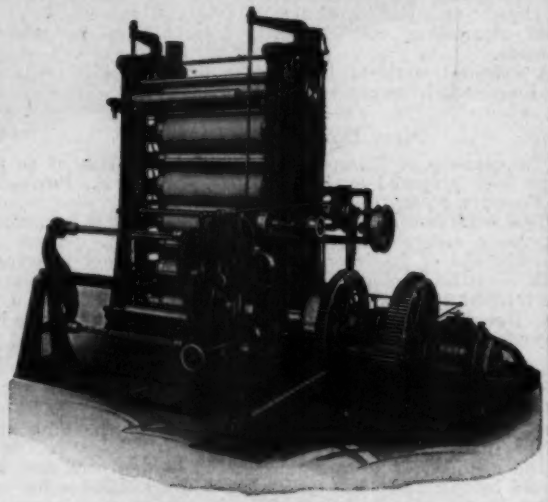

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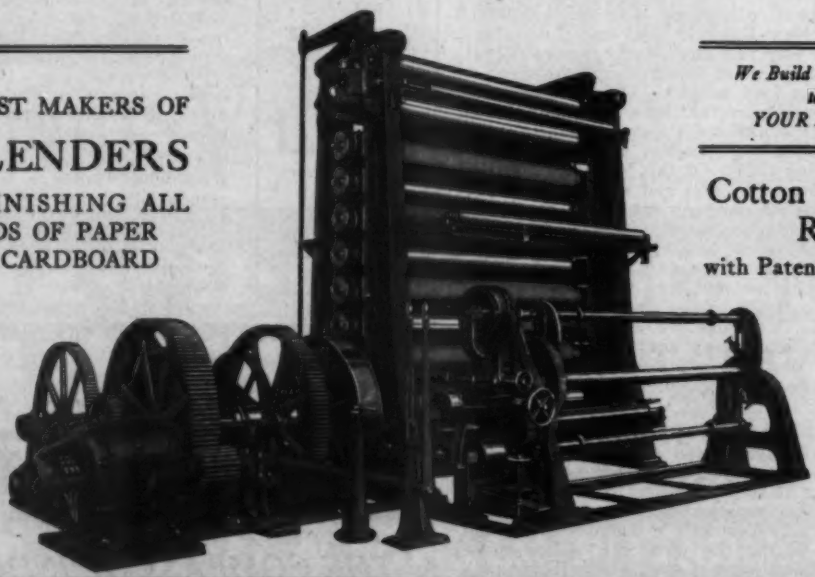

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wit displayed by the speaker, made it one of the most successful gatherings in Association history.

Representatives of a dozen New England mills were present, including Arthur L. Hobson of the St. Croix Paper Company, M. L. Madden of Hollingworth & Whitney, Waldo E. Pratt of the same company, C. T. Crooker, Fred S. Dolbeare of the Great Northern Paper Co., John E. A. Hussey of the International Paper Co.

About the middle of this month the new Pusey Jones kraft machine at Monroe Bridge, Mass., in the mill of the Deerfield Valley Paper Company will be in operation. It has been installed by the Meade Engineering and Development Company of Dayton, O., and it represents the last word in paper making machinery. It will start with a full capacity of 40 tons per day and the Boston offices of the company state that no trouble whatever is anticipated in marketing the product, and judging by the present capacity production of all New England mills this is true. Plans have been made for distributing the product through a well known New York house, which now handles the board produced by the mill. The soda pulp plant at Mountain Mills, Vt., owned by this company, is being moved to higher ground to allow for a huge dam that will flood the present location of the mill. The dam is in connection with a great power project of the New England Company, 50 Congress Street, Boston.

A traffic case of general interest was decided largely in favor of the International Paper Company by the Interstate Commerce Commission in a decision handed down last month. From this it develops that a consignee does not have to pay demurrage on cars "constructively placed" during time of removal from location where they are so placed to points of final placement. Constructive placement is defined as cars tendered to consumer on public or interchange tracks when consumer cannot or does not accept such cars because of congestion, negligence, etc. The case was brought on excess demurrage charged by the Boston & Maine railroad on a number of cars of coal, sulphite, and pulpwood for the International mill at Wilder, Vt. The road assessed embargo on some of these cars from first 7 A. M. after cars were tendered by written notice or constructively placed, not allowing for time to move to the mill at Wilder, Vt. The Commission ordered the railroad to pay reparation with interest.

Embargoes of one kind or another on practically all the New England railroads have at various times, this past month, interfered with shipments of paper to consuming points west of the Hudson. The Boston & Maine railroad on whose lines a large amount of paper originates and who receive paper in large amounts from the Maine Central, had a blanket embargo on all shipments to connecting lines, excepting certain necessities in which was included newsprint. Aside from this disturbing factor business has been of very good proportions among all classes of paper makers, excepting the board mills. The latter after their intense activity of September and part of October reduced operations substantially last month, several closing down completely for from three to six days and others shortening their regular working week.

By order of the Superior Court of Connecticut there will be sold on the premises at Norwich, Conn., Monday, December 4, the property formerly owned by the Ironsides Board Corporation, producers of paper board and known as the Uncas mill. It is an excellently equipped plant having two paper machines, one Black-Clawson 80 inch 5 cylinder fourdrinier and one Pusey & Jones 112 inch 5 cylinder machine. Complete lines of accessories including beaters, winders, pumps, calender stacks, and a steam plant with boilers equipped to burn oil are part of the material to be offered. The Norwich Saving Society is conducting the sale. The committee is headed by Gilbert S. Raymond. Ten per cent cash at sale is required, balance on delivery of deed. This mill has been bankrupt for several years.

Judge Peters in the Federal Court at Portland, Me., this past month, denied the petition of creditors of the bankrupt Cushnoc Paper Co., and Kennebec Paper Company of Augusta, Maine, for a new set of trustees for the former company. The petitioners for the removal of the trustees were the Liability Insurance Company, the Eastern Pulpwood Co., and the Great Northern Paper Co. Their argument was in effect that Messrs. Walter S. Wyman, Frank

Rebuilt Paper Mill Machinery in Stock and Guaranteed

Not Where Is and As Is

FOURDRINIER TISSUE MACHINE—One 68".
FOURDRINIER PARTS—Pusey & Jones 112", 100" equipped with new Century Shake. 96" Kutter Trowbridge.
PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housings and Black & Clawson swing arm housings. Press rolls 20"x88".
DRYERS—Four 48"x111". One 36"x80". Two 30"x84". Two 36"x74". Four 48"x72". Four 48"x68". One 84"x67". Eleven 42"x66". Eight 36"x62". Two 36"x48". Four 20"x39".
CHILLED CALENDERS—One 86" six roll. One 82" five roll. One 66" five roll. One 58" five roll. One 54" five roll.
SLITTERS AND WINDERS—One 120" Warren. One 108" Kidder. One 110" two drum Moore & White winder. One 82" Langston. One 46" Langston. One 40" Kidder.
BEATERS—Three N. & W. 72"x42". One Holyoke 54"x60" equipped with four Tyler washers. One Dilts 62"x50" iron tub. One Jones 62"x52". One Dillon 60x48". Two Emerson 54"x60". Three Dowington 54"x42" iron tub. One Jones 42"x36". Seven Horne 36"x36". One N. & W. 36"x26". Two No. 2 Claflins. Two No. 1 Claflins.
JORDANS—One Appleton Wagg Majestic. Two No. 2 Dillon improved. One Large Horne. Two Monarch. One Jones Standard. One Pope brushing.
SCREENS—One 12 plate. Two 8 plate open side Packer. Two 6 plate. Three White auxiliary and one Moore & White auxiliary. One single cylinder Wandel.
STUFF PUMPS—Deans triplex 9"x8". Goulds triplex 8"x12". Goulds triplex 6"x12". Beloit duplex 6"x14". Twelve 5" post.
REVOLVING SHEET CUTTERS—One 82", 62" and 48" Clark. Four 60" Hamblets. Four 60" Finlays. One 50" Hamblet diagonal.
REAM CUTTERS—Two 48" Acme. One 44" Holyoke Seybold.
SUPER CALENDERS—One 52", one 45", one 42", one 36" Holyokes.
WET MACHINES—Four 72" Bagley & Sewall hydraulic. One 48" Noble & Wood.
One 50" Farrel Board Calender.
One Manistee Hog Chipper.
One Ryther & Pringle Shredder.

We have a large number of pumps and over five hundred calender, press and couch rolls in stock.

Frank H. Davis Company

175 Richdale Avenue, Cambridge, 40, Mass.

Paper Mill For Sale

We offer for sale the plant of the **Hinde and Dauch Paper Company at Portsmouth, Virginia.** Three 1000-lb. and two 1500-lb. Beaters and one Refining engine. One 70" Fourdrinier Paper Machine trimming 62". Super Calenders—80" face. Product Kraft, 16,000 lbs. 24 hours. Pulp Mill, three Wet Machines. Two Rotary Digesters. Product Sulphate, 48,000 lbs. 24 hours. This plant could be readily turned over to the soda pulp process. Labor conditions excellent. R. R. Siding at Mill. Seventy-seven acres of land. Five buildings, 60,000 sq. ft. of floor space. Sprinkler system throughout. A complete Mill, offering an exceptional opportunity and at the right price and terms. Your interest is solicited.

GIBBS-BROWER COMPANY

Paper and Pulp Mill Brokers

261 Broadway, New York City

Telephone—Barclay 8829

OUR MOTTO—"Service First"

WYCKOFF WOOD PIPE

PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.

The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.

The Pipe of Service

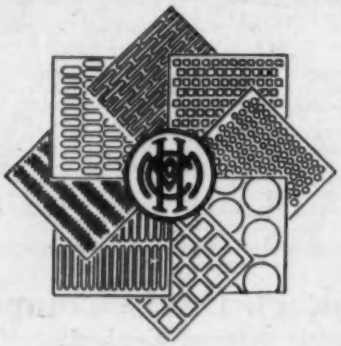
DURABLE—ECONOMICAL—EASY TO INSTALL

Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with steel bands whose tensile strength is 50,000 to 65,000 lbs. per square inch. The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.

Write today for catalog and prices

A. Wyckoff & Son Company

1855 Elmira, N. Y., U. S. A. 1922



Perforated Metal Screens

in all metals for pulp and paper mills

Elevator Buckets (Plain and Perforated)

Conveyor Flights and Trough

General Sheet and Light Structural Work

Light and Heavy Steel Plate Construction

Write for perforated metal handbook

Hendrick Mfg. Company

Main Office & Works
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New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

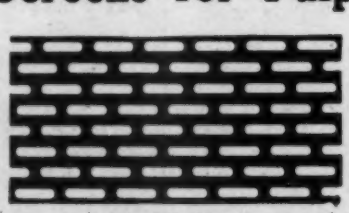
Send for full particulars

Hungerford & Terry, Inc.

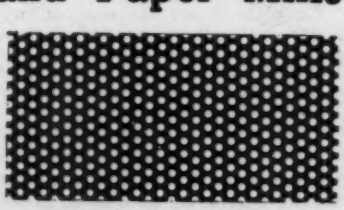
CLAYTON, N. J.

Perforated Metal Screens for Pulp and Paper Mills

.065 inch round



1/8 x 1/2" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

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Bleached and Easy Bleaching

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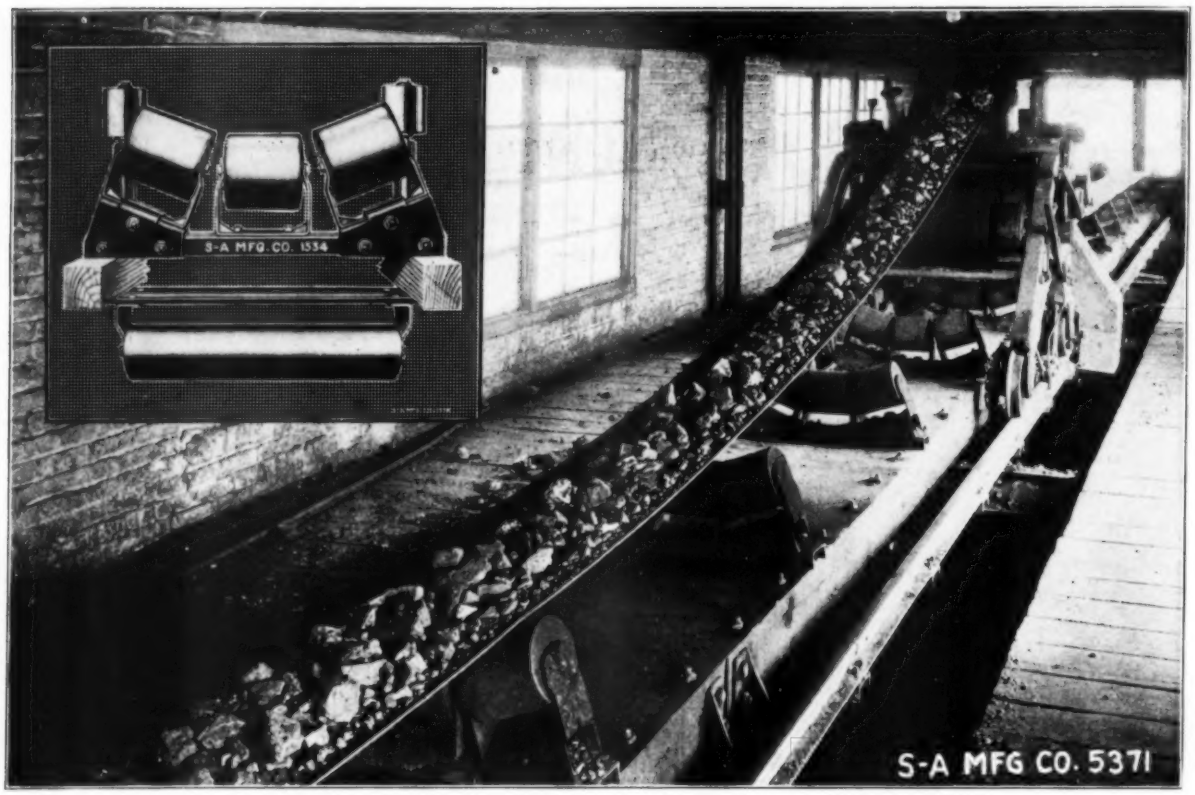

"S-A Belt Conveyors," Catalog No. 26, contains complete detailed data concerning advanced practice in belt conveyor design. A copy should be on every engineer's desk for quick reference.

Ask for Your Copy

The Conveyor Carrier That Prolongs the Life of the Belt

The reliable service given by the S-A Unit Ball Bearing Carrier in addition to the saving incurred in power, belt wear and lubrication, makes this carrier the best investment for the discriminating purchaser.

With the smooth-running, easy-turning, ball bearing rollers, the belt wear is practically negligible.

BUILT IN A WIDE VARIETY OF SIZES AND STYLES TO MEET THE REQUIREMENTS OF THE INDIVIDUAL CUSTOMER

We Also Build

Feeders
Pan Conveyors
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Screens
Skip Hoists
Car Pullers
Friction Hoists
Coal Crushers
Portable Conveyors

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STEPHENS-ADAMSON MFG. CO.

AURORA, ILLINOIS

D. True and Edwin M. Frye should be trustees for both companies, that each concern should have a separate group in control, and that the present trustees were interested in companies which made their trusteeship prejudicial to the best interest of creditors of the bankrupt mills. The judge found no evidence of cause for removal.

On December 4, the Great Northern Paper Company will declare a stock dividend of 200 per cent. It is payable on that date. It followed the approving by stockholders of the increase in capitalization of this company from $8,300,000 to $25,000,000. The stock of the Great Northern Paper Company, of which there is only one class, the common, has increased in the outside market to well over $400 per share. It has been paying dividends at the rate of $24 per annum. It is closely held, Garret Schenck, founder and president being one of the largest shareholders. Great Northern is the largest independent newsprint maker in the world and has the largest paper production under one roof of any company in the world. It has been very successful owing to its low costs and its rich timberlands.

"The largest Book Paper Mill," which the Oxford Paper Company considers itself to be, has issued this past month the finest piece of paper advertising recorded in months. A beautiful book of "Polar Coated", a famous product of Rumford Mills. The work that can be done with this paper is shown. It has been distributed throughout the country through merchants representing Oxford. It is in keeping with the close policy of co-operation between merchants and mill adhered to by this company.

Foundation is being built for a storehouse for the Great Northern Paper Company at their Madison, Maine, mill. It will be built on the premises of the company. The architects are C. P. Crowell and W. S. Lancaster of the Exchange Building, Bangor, Me. The contractors are Horace Purinton Co. of Waterville, Me., while the roofing will be done by the Boston office of the Johns-Manville Co. The construction is wood, the building to be one story and 60x180 feet.

The modernizing of the Pejepscot Paper Company's mills goes on apace. The Company has recently completed construction of a new boiler house and has installed two large electric generators. All four mills are being brought up to top-notch form in efficiency, under the progressive policies of F. E. Clark, general manager, who is continually seeking methods by which the output can be improved, and the mills rendered more efficient.

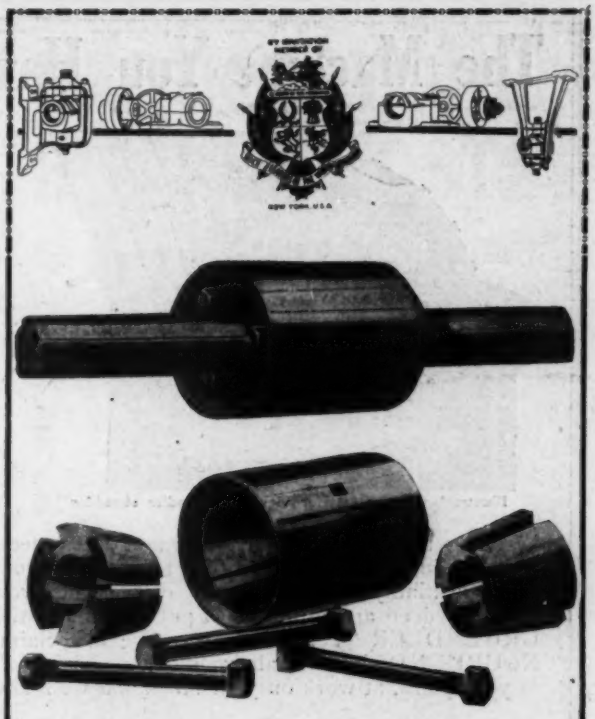
The Parker Young Company of Boston operating two pulp and paper mills in New Hampshire, namely, the St. Croix Paper Co., and the Great Northern Paper Company, all report a great and apparently increasing shortage of woods labor. Unable to obtain sufficient help in the Maine and New Hampshire cities and towns they have undertaken extensive daily newspaper advertising in Boston.

At a meeting of the New England Purchasing Agents Association at the Boston City Club held last month, the paper conference was the most largely attended. An interesting address was made by W. F. McQuillen, former president of the National Paper Trade Association who told that paper could be considered as good a barometer of industrial conditions as steel.

Almon S. Bisbee of Portland, in charge of the social service work of the Great Northern Paper Co., started recently for a tour of the company's logging camps in the northern Maine woods accompanied by Ernest J. Hill, a prominent vocalist. They will conduct song services and give stereopticon talks in the various camps, covering a distance of 600 miles in all.

The Pine Tree Pulp Co., of Brunswick, Me., a recently established concern, has acquired an especially attractive piece of pulpwood land near Boothbay Harbor, Maine. It is located on tidewater and has facilities for loading on ships a short distance from cutting location.

A very popular employee of the International Paper Company at Pierce Field, Me., W. B. Graves, yard foreman, died recently at the age of 64 years.



A Coupling that is as Strong as the Shaft Itself

The Double Cone Compression Coupling, as we make it, is absolutely the strongest coupling of the compression type.

Correctly proportioned to transmit the full capacity of the shafts it connects.

Each shaft is firmly held by a separate cone, and the cones are wedged and keyed into a continuous double-tapered sleeve or cover, overcoming any slight variation in shaft sizes, thus insuring perfect alignment in all cases. Then, too, they are

Easily Applied or Removed

We also make a belt type, Flexible Coupling for directly connecting Motors or Engines to Shafts or machines, and, in fact, everything for the mechanical transmission of power by belts or ropes.

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY

The Machine You Have Been Waiting For—

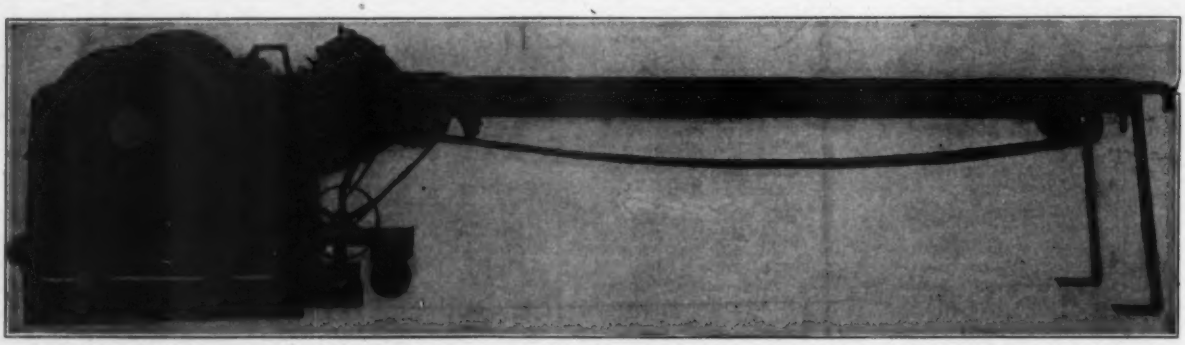
Illustration shows interior view of Gruendler shredder

EVENTUALLY you are going to shred your Pulp Laps (both Chemical and Mechanical), because it is the short route to the Stock Chest. Naturally you are going to want the best shredder obtainable and the GRUENDLER fills that need, because whether Frozen, Dry or direct from the Wet Machines (regardless of the moisture content) the GRUENDLER will handle it in capacities to suit the requirements of your mill.

We have shredded for others and met their specifications in every way—in order to prove to you, will you kindly send us samples of the stock you wish shredded and allow us to put it through the GRUENDLER "Tornado" and prove this claim. No GRUENDLER is a sale, unless it "makes good" in your plant, at work on your stock and we know what a GRUENDLER will do, but we want to show you and let you convince yourself. More than 35 years of successful manufacture of crushers, shredders and grinders, with some of the largest manufacturers of this and other countries as users, make us know that the above claims are well within bounds.

GRUENDLER PATENT CRUSHER & PULVERIZER CO.
FIRST AND FRANKLIN AVENUE ST. LOUIS, MO.

No. 11 "GIANT" PAPER STOCK CUTTER



Capacity 2½ Tons Per Hour
Especially Adapted for Handling Waste Paper, Magazines, Etc., Before Feeding to the Beaters

Whatever You Cut, A GIANT Will Solve Your Problem

LET US FIGURE IT OUT FOR YOU

TAYLOR, STILES & COMPANY, Riegelsville, N. J., U.S.A.

WATEROUS ENGINE WORKS
Brantford, Ont., Canada
Canadian Representatives

R. J. MARX
133 Finsbury Pavement, London E. C.
Sole Agents for Europe

The Paper Products Co., Inc., of Portland, Me., was recently chartered in that state to do a general manufacturing and mercantile business in paper etc. Ralph T. Parker of Rumford is president; Frederic A. Pullman of Mechanic Falls, treasurer, Leroy F. Limerick of Mechanic Falls, the third director.

Work is progressing rapidly on the new Mallison Falls, Me., power house which is being built at South Windham, Me. Machinery should be ready for installation by January or early February. The H. P. Cummings Construction Co. of Portland are the builders.

The E. D. Ward Company of Worcester has the general contract to erect an additional large factory at the plant of the Kupfer Brothers Co., manufacturers of coated papers at Riverdale, Mass. Work has already begun and will take several months.

One of the heaviest purchases of British coal made by any New England industry was that of the Great Northern Paper Company, which purchased a large tonnage that was discharged on the Bangor & Aroostook's cars at Searsport, Me.

Kalamazoo Valley

Kalamazoo, Mich., December 1, 1922.

Illinois Corporation Takes Over Eddy

The Eddy Paper Company, operating three large mills at Three Rivers and White Pigeon, Michigan, has disposed of all its assets to the Eddy Paper Corporation, of Illinois, a concern with a capitalization of 125,000 shares, no par value common and $350,000 seven per cent preferred stock.

The deal was concluded at a meeting of the stockholders in Kalamazoo, Michigan, November 25, 1922. Over seventy-five per cent of the stock was represented either in person or by proxy.

The terms of the transfer will give present stockholders in the Eddy Paper Company, holders of $7,000,000 in common stock, and approximately $1,750,000 preferred stock in the old corporation, 31,250 shares of no par value stock in the new corporation.

The available list of stockholders shows approximately 300 are holders of the 700,000 shares of common stock, while the preferred stock list totals about 475 names, holding lots under 500 shares. The stock is held all throughout southwestern Michigan.

Seventy-five per cent of the stock in the new company has been underwritten by the Chicago stockholders at $20 a share. This provides $1,875,000 of new capital.

The Illinois corporation has assumed all debts of the old Eddy Paper Company. Certain creditors have agreed to accept the $350,000 seven per cent preferred stock, while the outstanding portion of the second million dollar bond issue, about $300,000 in all, will be immediately retired. The trustees of the first bond issue, $1,250,000 have accepted the terms of the transfer and these bonds will be carried to maturity.

Allotment of stock and other details in the transfer will be perfected at a meeting of stockholders, which will be called in the immediate future. Undoubtedly this meeting will take place in Chicago.

Howard Buckhout, secretary of the old Eddy Papes Company, expressed his approval of the transaction. He said that it was the best thing that could be done and save anything for the stockholders.

It is impossible at this time to learn the identity of the Chicago parties who are interested in the new company. Rumors have been passed that two men, prominent in banking circles are interested, and two others interested in the paper industry are also included. It is also believed throughout the Kalamazoo Valley that Julius Rosenwald of the Sears, Roebuck Company is interested in the deal.

It is reported there will be no change in the management of the mills. Mr. Charles A. Blaney will continue as president. He expressed himself as perfectly satisfied with the transaction, and further states, "that it was the best thing that could be done, when all things are considered."

The Kalamazoo Vegetable Parchment Paper Company still continues its good work in making for better housing conditions for its employees. The erection of three new homes has been started on a new addition known as the Hobbs, Lawler Platt, and more are to follow in the very near future. These houses are to be real homes for the working

REDUCE YOUR BEATER COSTS

By running your Paper Stock, Magazines, Books, Old Paper and Boxboard, Frozen or Dried Pulp Laps through a

MITTS & MERRILL

GRAVITY FEED

SHREDDER

All kinds of stock can be prepared, which will make the beating job take less power and do the work in less time.

We also build the best "Hog" in the world to reduce pulp mill bark and wood refuse.

MITTS & MERRILL

1013 Tilden St., SAGINAW, MICH.

The Noble & Wood Machine Co

Hoosick Falls, New York

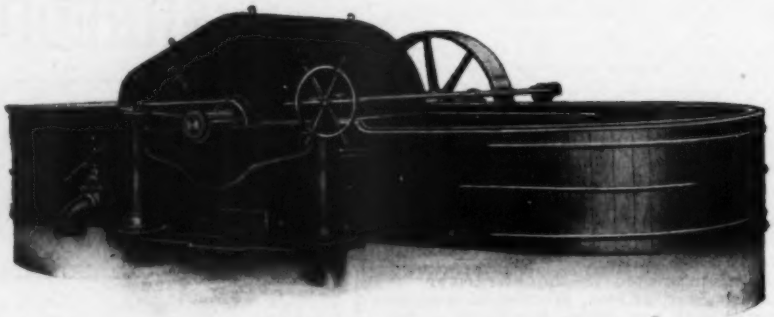
LOOKING for an efficient process for treating your old paper stock?

Write for our Paper Pulping Engine Bulletin

Paper Mill Machinery

E. D. JONES & SONS CO.

PITTSFIELD, MASS.



Beating Engine, Tub of Iron or Wood

Manufacturers of

Paper Making Machinery

people. They are well designed and carry every modern convenience, being far better than the ordinary working man's home. This represents but one phase of the community spirit fostered by the Kalamazoo Vegetable Parchment Company in its endeavor to build up a harmonious and pleasant living atmosphere for its employees.

The paper mills in Kalamazoo, have been confronted by a serious car shortage during the past few weeks. Trouble has been experienced in the movement of their goods to the west. This is due to an order known as number 33 which demands that all freight cars belonging to Western roads be returned to Chicago, empty. The heads of the various paper mills in Kalamazoo have referred the situation to the Kalamazoo Chamber of Commerce in the hopes that some aid in this matter may be secured. No definite action has been secured at the present writing, but it is believed that the situation will soon be remedied.

The various paper mills throughout the Kalamazoo Valley all report a good business during the past month. There is apparently not let up for future prospects with the arrival of the holidays; everyone expressing the belief that the mills would continue their full-time policy throughout the yule-tide season. The box-board mills report a splendid business, and, even though they have not had to resort to part-time work during the past few months, are looking for an increased business in the future. Other mills producing book paper and the like, are all operating on the full-week schedule, and expect to continue to do so.

This new central power plant of the Bryant Paper Co., will be a plain structure of concrete and steel, 105 by 113 feet in dimensions, and 76 feet high. It is classed as a one-story building. Plans for the structure are now being prepared by V. D. Simons of Chicago. The total cost of the building is set at $80,000. Ground has already been broken for the erection of the new building.

Black River Valley

Watertown, N. Y., December 1, 1922.

The remote control system, a plan designed to reduce labor costs in the operation of power plants located at some distance from paper mills, has just been installed by the Newton Falls Paper Company of Newton Falls. All the material was purchased from the General Electric Company at Schenectady. The power house of the Newton Falls Company is situated about half a mile down stream from the mill, and the services of six men have been required to run the plant. With the remote control system, most of these men are eliminated, and automatic control over the power house is given by the switchboard situated in the motor room just off the paper machine room in the main building.

Freeland J. Morrison, for the past year in charge of the technical control department of the Newton Falls Paper Company at Newton Falls, has resigned his position to take a similar one with the Hummell Ross Fibre Corporation of Hopewell, Va. He will leave for Virginia December 1.

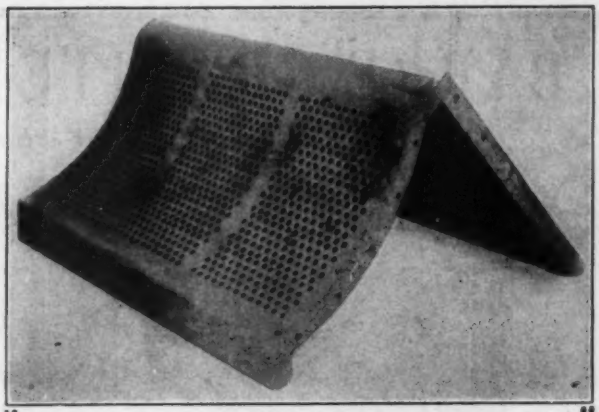
Foreign Correspondence

Dresden, December 1, 1922.

The German Paper Yarn Industry

The raw material for paper yarn is the soda cellulose. Its color resembles that of the gummy fibre (jute.) The qualities which give it value are, low specific weight, remarkable toughness and strength, chemical purity with a small residue of ash. The first experiments were made by means of the wet spinning method. Much better success has been obtained, however, by the Clavies dry spinning process, named after its inventor, a Saxon. In this process the finished paper rolls are cut by special machine into strips which, after having been moistened, are spun into yarn on specially designed machines.

The originator of this dry process has also invented the "Textilose," with which one side of the paper strips are covered with a veil of jute or cotton fibres. These strips are then spun as usual. A yarn has been created which is called "Textilit." This is made from paper strips spun together with hemp, flax and jute waste or tow. This mixture contains 60 to 70% paper with from 30 to 40% fibres and shows remarkable strength. As early as 1913, German mills produced 30,000,000 kilograms of cellulose yarn. During the war, in spite of unfavorable conditions, they were able to substitute one third of the hitherto imported jute by home



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company

MIDDLETOWN, OHIO

"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.

DAYTON, OHIO

BARRE GRANITE IN PRESS ROLLS

Is Revolutionizing the Whole Paper Making Industry

If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

Jones Brothers Company

BARRE, VT. **BOSTON, MASS.**

The BLACK-CLAWSON Co.

HAMILTON, OHIO

Builders*—Paper and Pulp Mill Machinery—*for

INCREASED PRODUCTION **SERVICE ALWAYS**

products. It is estimated that at least one-fifth of the jute utilized in Germany can be replaced by pure paper yarn, and the remaining four-fifths by hemp "Textilose" or "Textilite" thread.

The cable service has employed for several years paper yarn to a large extent for insulating and as a filling material. The carpet industry consumed, even before the war, 500 tons of cellulose yarn every year. In the linoleum industry these paper tissues serve as stiffening sheets. Enormous quantities are also used for making curtains, well coverings, sacks and bags. The better sorts can even be washed and occasionally dresses have been made from them.

Paper Exports in Germany

The paper industry is one of the few branches here which obtains its raw material almost completely from inland sources.

This tendency has increased since the war with the falling currency. Germany imported during the first half year of 1913, 377,460 kilograms of pulp wood and for the same period during 1922, 197,540 kg., 1913, 24,270 kg. pulp and in 1922, 33,780; 1913, 32,370 kg. rags and 8,820 kg. in 1922; 12,090 kg. waste paper in 1913 and 10,190 kg. for the same period in 1922. 126,610 kg. unprinted paper and cardboard were imported during the first six months of 1913 and only 1,260 kg. during the same period in 1922.

There was practically no export of pulp wood this year, having decreased from 25,440 kg. in 1913 to 650 kg. this year. Almost the same can be said of waste paper. With regard to rags, exports surpass imports in a much larger degree than in 1913 owing to the fact that Germany could not utilize the enormous piles. Before the war little notice was taken of waste paper; only book binding shops and factories for paper ware collected and sold it. Individuals used it for wrapping or fire. Since the war, paper has become an extremely valuable article. Since November it has shot up to 800 times the 1914 price. Shopkeepers who wish to buy old newspapers for wrapping, and dealers in rags and waste matter are constantly advertising in Germany's daily papers for old papers, offering high sums for any kind of paper. Only pulp shows increased imports; on the other hand the exports have also improved, although only 8% of the total production. As regards to paper, cardboard, etc., imports have greatly decreased owing chiefly to the low value of German money. The fact that home consumption of paper stocks has been extremely sluggish has reacted in a remarkable increase in exports. This is proof of the activity of the paper industry. The average monthly export of printing paper was twice as much in 1922 as it was in 1913. The publishers of daily papers are often unable to pay the incredible price. Many hundreds of daily and weekly papers cease to exist; others cut down on the number of pages in their publications, hence the mills sought another outlet and found it in Argentine and the United States. Without such exports, some of the German mills would have been compelled to close down.

Merwin Paper Company Sold

Chester N. Stevens who has held responsible positions with the Barrett Company, well known roofing manufacturers, for many years, has just purchased the Merwin Paper Company at Windsor, Conn. The Gibbs-Brower Company, paper and pulp mill brokers, under their sole selling agency contract sold this mill to Mr. Stevens and his associates for R. B. Newell, vice president of the Fidelity Trust Company of Hartford, Conn., acting as liquidating agent for the trustees of the Merwin Paper Company.

The Merwin Paper Company began business many years ago at Windsor, Conn., near Hartford, and has developed from a small water power mill to its present modern, hydro-electrically equipped plant. The output of the mill has always been a very high grade and has enjoyed excellent reputation.

Mr. Stevens' organization will be known as the Stevens Paper Mills, Inc., with headquarters at 52 Vanderbilt Avenue, New York City, and paper specialties for industrial uses will be manufactured at the mill. According to Mr. Stevens, the present plan is to produce two or three grades of paper, the demand for which is immediate in a concentrated territory. These grades will include Jacquard board and press board used in the textile industry and fibre board used for insulation in electrical work.

The actual operation of the mill is under the direction of George C. Russell, vice-president of the new company, who for the past fifteen years has managed two mills of the Barrett Company. By his purchase of this property, Mr. Stevens has achieved his life long ambition of becoming a paper mill owner, having come from a paper making family

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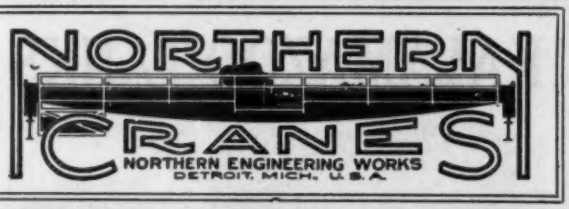

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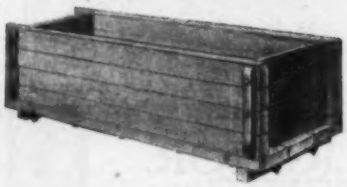

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Horton ***Steel*** tanks are superior.

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113

NEW YORK: 3150 Hudson Terminal. CHICAGO: 2445 Transportation Bldg. MONTREAL: 1133 Bank of Toronto Bldg.

and having operated and managed some of the Barrett Company's largest properties. There is no doubt that the outstanding ability and long experience of Mr. Stevens will insure the success of this venture.

Site Purchased for New Board Mill

The F. W. Muir Board Company, Inc., has secured a site on the banks of the Whippany river, near Morristown, N. J. They are planning the construction of a new, modern board mill, specializing in friction electric, pattern and binder's board. The plant will be operated by steam and electricity. The president, Frank W. Muir, is the eldest son of the late James H. Muir. He was for many years associated with his father from whom he gained a practical knowledge of the manufacture of board.

F. W. Muir is president and general manager of the new company. The other officers are: E. Muir, vice-president and Robert N. McLeod, secretary and treasurer. Mr. McLeod is at present the superintendent of the Manhattan Rubber Company's new plant at Manhattan, N. J.

Pulp Mill to Make Paper

The Ogdensburg Paper Mills, Inc., of Ogdensburg, N. Y., established about three years ago by the late James A. Outterson and Mr. F. A. Augsbury have been taken over by Stuart D. Lansing, George M. McKee and Mr. F. A. Augsbury.

This mill was built primarily for the manufacture of ground wood pulp. It is now, however, the purpose of the new managers to install a paper machine with a daily capacity of 80 tons.

The Tidewater Paper Mills Company, located in Bush Terminal Bldg. No. 8, Brooklyn, was recently sold by the New York Times Company to the Tidewater Paper Mills Sales Corporation. John A. Acer, of Montreal, is chairman of the new board of directors. Other officers of the new corporation are: John D. Coffin, President; C. T. Rue, Vice President; F. W. Westlake, Treasurer and E. S. Pincott, Secretary. The Manhattan office of the corporation is located at 33 west Forty-Second Street.

First mortgage 7½ per cent ten-year sinking fund bonds maturing October 1, 1932, have been sold by the Bastrop Pulp and Paper Company of Bastrop, Louisiana, to Wm. L. Ross & Company and H. P. Wright Investment Company of Kansas City to the extent of $650,000. The company now owns and operates a modern sulphate pulp mill and will use this loan in the building of a kraft mill which, it is planned, will absorb their entire output of pulp.

A recently incorporated company, Pacific Straw Paper and Board Company, is making plans to erect a plant at Vancouver, Wash. Mr. Charles F. Schaub and Geo. A. Sweet of the new company have decided upon Vancouver after making a careful study of numerous potential sites on the pacific coast.

The Marathon Paper Mills Company, Appleton, Wis., has filed a trust deed for $3,000,000 with registers of deeds in numerous Wisconsin counties. The money is to be used in making improvements and enlargements to the mills of the company. The First Wisconsin Trust Company holds the mortgage.

It is anticipated that work will begin soon on the link connecting the Soo line and the Omaha at Lemington, Wisconsin. The completion of this link will shorten by 40 miles the transportation of logs to pulp mills at Ladysmith, Wis., which have timber tracts in the eastern part of the country.

Ames, Emerich & Co. are offering at par and accrued interest, $800,000 Bedford Pulp & Paper Co., Big Island, Va., first mortgage, twenty year sinking fund, 4½ per cent bonds. These bonds are part of a total authorized issue of $1,000,000 and are secured by total net assets exceeding $3,349,000.

The Fresno Paper Company of Fresno, California, has plans nearing completion for the erection of a new mill. This mill will have the capacity to produce paper and paperboard at the rate of 40 tons per day. The entire cost of the mill is estimated at-about one half of a million dollars.

A paper plant will be built by the Columbia River Paper Mills at Vancouver, Wash. The plant will include a saw

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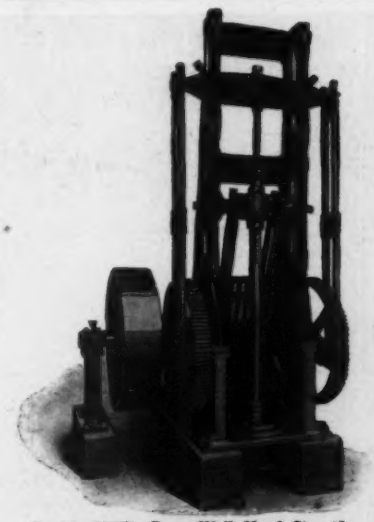

Double Stroke Deep Well Head Size 3L, Arranged for Belt Drive.

Write for Bulletin 27-C

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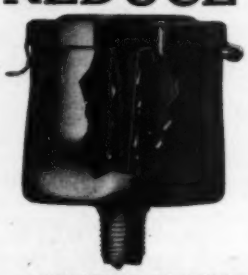
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"SHURFLO"
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OIL CUPS
Try some, free, for 60 days. Capacities ½-oz., 1½-oz., 3-oz., 5-oz. and 10-oz. What sizes shall we send? Folder free.
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WITH Diamond VALV-IN-HEAD soot blowers the number of manual operations is very greatly reduced and opportunity for errors in those performed is extremely limited.

As with previous mechanical soot blowers the use of the Diamond VALV-IN-HEAD effects a saving of four to eight per cent fuel. As compared to previous mechanical soot blowers the Diamond VALV-IN-HEAD possesses the following distinct advantages:

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Remember that Diamond blower elements used in the hot passes of water tube boilers are CALORIZED.

One of the most interesting publications in the power plant field is the bulletin describing Diamond VALV-IN-HEAD soot blowers.

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VALV-IN-HEAD SOOT BLOWERS

mill, box factory, sulphite mill and paper mill. The new plant will involve an investment of $1,500,000 and will employ about 450 men.

The P. A. Sorg Paper Mills of Middletown, Ohio, have recently been granted a building permit to build a modern iron warehouse to be used for the storage of paper. The necessity for this new warehouse has been brought about by the steadily increasing business of the above mentioned company.

The Central Paper Company, of Muskegon, Michigan, which has recently disposed of a $1,100,000 bond issue, has drawn up plans for the erection of a new 3-story addition to its plant. The cost of this addition is estimated at about $22,000.

Contract has been awarded by the Paper Maufacturing Company, Inc., for the construction of a $500,000 plant in Philadelphia. Plans were prepared by Clarence E. Wunder and the contract has been awarded to J. S. Rogers Company.

The Union Paperboard Company of Averyville, Ill., reports the loss of 1,000 tons of straw estimated at a value of $5,000. The loss was the result of fire which occured the early part of last month.

Fire on November 4 damaged a portion of the plant of the Peerless Fibre Co., Cohoes, N. Y. The loss was estimated at $10,000.

Judge De Vries Enters Private Practice

Among those men who, during the past few years, have transferred their responsibilities from vital governmental affairs of the nation to private enterprises is Judge De Vries, former presiding judge of the U. S. Court of Custom Appeals.

Appointed by President McKinley twenty-two years ago as a member of the Board of U. S. General Appraisers, Judge De Vries has since served the government under every succeeding president. From 1906 to 1910 he was president of the Board. President Roosevelt sent him to Europe to investigate the customs administrative laws in France, Germany and England. In 1909, at the request of the Senate Finance Committee and President Taft, he drafted the customs administrative provisions of that act. He originated the U. S. Court of Customs Appeals and drafted the first bill creating it.

During the recent session of Congress Judge De Vries, at the request of Chairman McCumber of the Senate Finance Committee and Chairman Fordney of the House Ways and Means Committee, drafter the flexible tariff provisions of the present tariff law. It is said that not only these two legislators but President Harding as well regard him as the "father" of the administrative sections of the Fordney-McCumber tariff act. He was, in fact, referred to by the President as the government's greatest legal authority on the tariff.

The Judge will practice law in association with Thomas J. Doherty, for many years assistant counsel for the government in the prosecution of customs cases.

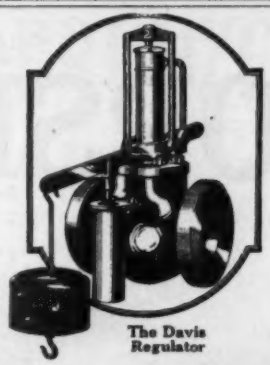
S. L. Willson to Manage A. W. P. Co.

President George A. Galliver of the American Writing Paper Company in announcing the appointment of S. L. Willson, formerly director and vice-president of the Graham Paper Company, of St. Louis, Mo., to vice-president and general manager of the American Writing Paper Company, says that Mr. Willson's achievements and outstanding abilities, exemplified in his successful career in the paper industry and paper merchandising field, have won for him universal recognition, and the liking and respect in which he is held by the entire paper industry are an indication of high character and integrity.

His exceptionally able service rendered to the United States Government as a member of the War Industries Board in 1918, is a proof of his acumen and judgment; and the thorough accomplishment of his duties and the equitable rendering of his obligations alike to the War Board, the paper makers, the merchants and paper consumers during his incumbency aroused universal admiration.

Mr. Willson will take up his new duties Jan. 1.

Parker Corning, president of the Albany Felt Company, Albany, N. Y., was elected to Congress from the 28th district, on the Democratic ticket, November 7.



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WHY GAMBLE? Why accept a substitute—an untried valve specialty—when you can get a device backed by almost a half century of dependable service.

For forty years engineers have been testing the Davis Pressure Regulator for you. In service, it has shown that it will unfailingly reduce a high steam pressure to any required lower pressure and maintain the reduced pressure constant.

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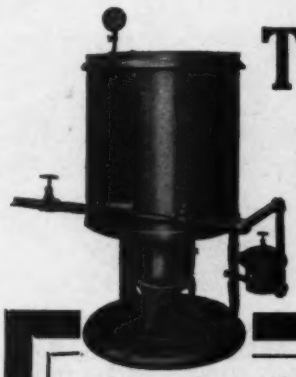

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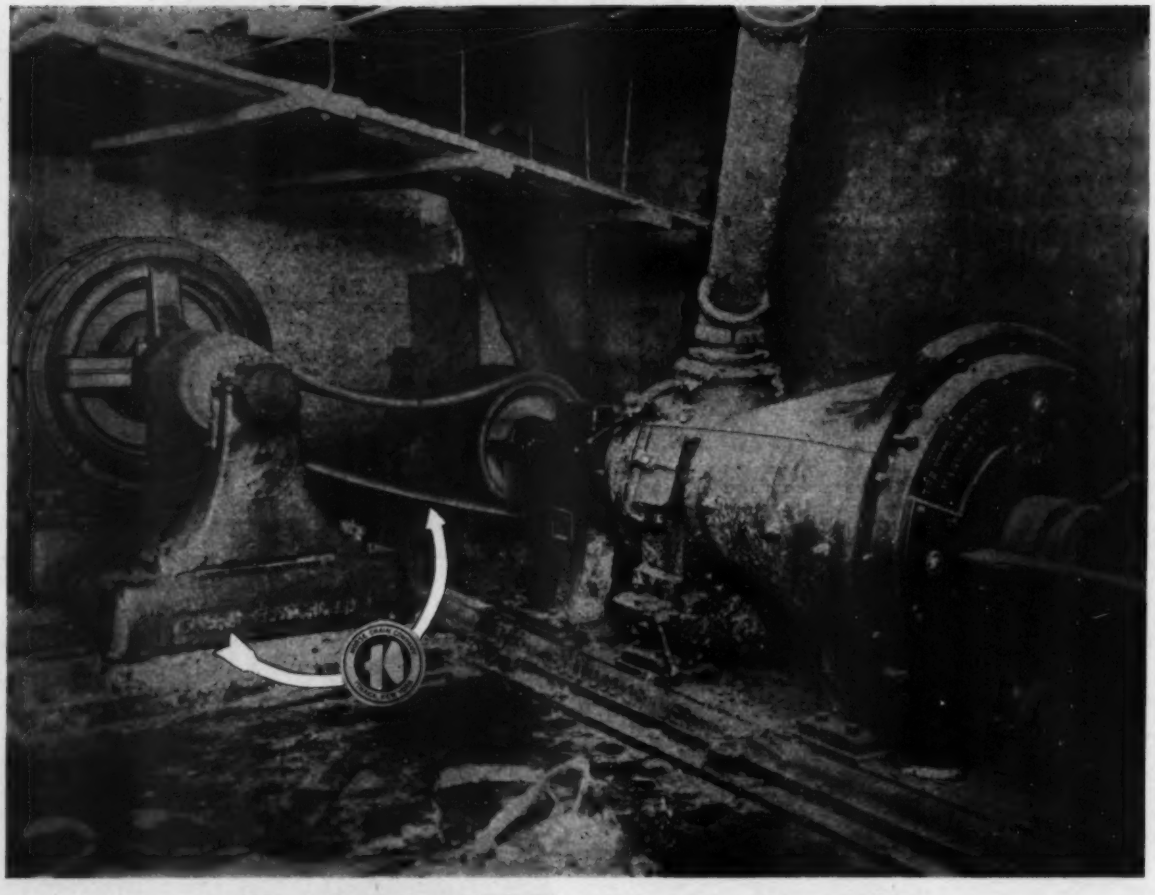
Longer Life



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The illustration shows one of the fifteen Morse Silent Chain Drives in the mill of the Congoleum Company, Asbestos, Maryland, driving a Jordan engine from a 150 H.P. motor on felt stock, one of the hardest kinds of stock to refine.

This mill uses the following Morse Chain Drives:—one 150 H.P.; four 100 H.P.; nine 90 H.P.; one 75 H.P.; all doing splendid work.

Morse Chains are 99% efficient, silent, durable and economical to maintain.

Where you have unusual and hard conditions from wear and exposure, Morse Silent Chains prove their greatest worth.

For driving Jordan engines, beating engines, paper machine line shafts, and for many other places in the paper mill, the ideal drive is the Morse Silent Chain.

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"Morse" is the Guarantee Always Behind the Efficiency, Durability and Service

F. L. Moore in Pulp Products Corp.

Frank L. Moore, for two terms president of the American Paper and Pulp Association, and formerly heavily interested in the Newton Falls Paper Company, has purchased common and preferred stock, making him the largest individual stockholder in the U. S. Pulp Products Corporation of Newark, N. Y. He becomes president and general manager of the corporation. Mr. Moore's home is in Watertown, and he will spend much of his time there in the future as well as at Newark.

The corporation manufacturers egg carriers, pie plates, electric lamp carriers and cigar holders from waste paper and pulp. The capacity of the plant is now 100,000 egg carriers a day, and Mr. Moore plans to double this output. A plant will also be erected in Canada, it is announced.

Most of the stockholders of the corporation live in Syracuse. The officers besides Mr. Moore are: E. F. Fox of Newark, secretary; J. P. Goettel, treasurer, and Lindsay Hooper of Boston, director.

News Personals

Mr. H. B. Wadsworth, 51 East 42nd Street, New York, returned October 28th from a successful trip to Japan. While in Japan, Mr. Wadsworth made new connections with one of the largest importing firms, severing his relations with The Meishosha Company, Ltd. In the future the New York end of the business will be conducted solely by Mr. Wadsworth. Mr. Wadsworth found business in general in the Far East rather quiet but reports that there is every indication of a decided improvement in 1923. Mr. Wadsworth visited practically all the principal paper mills during his three months' stay and secured quite a number of orders for paper mill supplies.

J. B. Purves of Port Arthur, Ont., has been appointed manager of the Biron mill of the Consolidated Water Power and Paper Company. He will fill a vacancy made by the resignation of Fred Eberhardt. Mr. Purves was formerly with the Interlake Pulp & Paper Co. Division of the Consolidated and in taking up his new work is renewing old connections. After leaving the Interlake plant at Appleton, Wis., he took charge of the pulp and paper machinery department of the Port Arthur Shipbuilding Co.

The Standard Turbine Corporation of Wellsville, N. Y., announces the appointment of Mr. E. E. Maher as district sales manager in Chicago. His office will be located at 2237 Insurance Exchange Building and from it will be handled the greater part of the company's business in the territory including Indiana, Illinois and Iowa. Mr. Maher is well known to the trade and is a member of the Western Society of Engineers, also the American Society of Mechanical Engineers.

An erroneous statement has appeared in the columns of of another magazine to the effect that Daniel O. Stock, formerly of the American Writing Paper Company is now sales manager of the Seaman Paper Company. Mr. Stock has become associated with the Munising Paper Company, Munising, Mich., and Frank A. Borchers is still vice-president and sales manager of the Seaman Paper Company.

Mr. S. A. McLernon of the Canadian Fairbanks-Morse Company recently visited the quarries and plant of the American Pulp Stone Company at Littletown, West Virginia. The pulp stone company reports keen and growing demand for large magazine stones as well as the stones for ordinary pocket grinders. Mr. McLernon's company is exclusive selling agent for the American Pulp Stone Company in Canada.

Two new members have been added to the sales force of the Urquhart Paper Company, of 22 Reade street, New York, in the persons of Frank A. Hatch and Edwin B. Wadsworth, both of whom resigned from the firm of Henry Lindenmeyer & Sons to become connected with the Urquhart company. Messrs. Hatch and Wadsworth were with the Lindenmeyer organization for 14 and 16 years, respectively.

Mr. C. E. Youngchild, former assistant superintendent of the Nekoosa Paper Mill of the Nekoosa Edwards Paper Company, has been appointed superintendent. Mr. Youngchild fills the vacancy made by Mr. C. A. Wiley, former superintendent, who was promoted to the position of assistant director of manufacturing of all the mills of the N. E. P. Co., at Nekoosa, Port Edwards and Wisconsin Rapids.

BRONZE
Beater Bars

Manganese Bronze Beater Bars

Will outlast steel bars 5 to 1
Will not discolor paper stock
Are tougher and stronger than steel
Will not corrode
Will save money in operating costs
Tensile strength, 75,000 lbs. Yield Point, 38,000 lbs. Elongation, 20% in 2 in.

Hy-Ten-Sl Bronze Bars for Jordan Engine Fillers

Outwear anything on the market, by a wide margin.
This metal is as strong as Nickel Steel.
Tensile strength, 110,000 lbs. Yield point, 60,000 lbs. Elongation, 12% in 2 in.

Dill & Collins Co. wrote an interesting letter about these bars. Write us for a copy of it.

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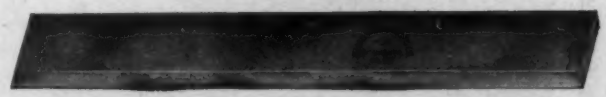
MANUFACTURING COMPANY
Machine Knives
FOR
Paper and Pulp Mills



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SIMONDS MANUFACTURING CO.
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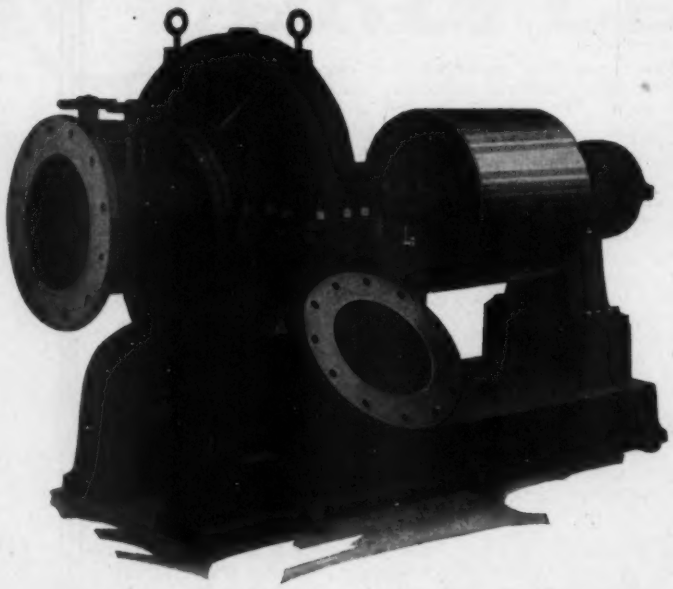
"Buffalo" Paper Stock Pumps

Upper Half Casing Removable Without Breaking Gaskets



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BUFFALO FORGE COMPANY, Buffalo, N. Y.

Egbert H. Farr and Charles Swanson, who have heretofore been with the Gatti-McQuade Company, of New York City, in the Philadelphia branch of that concern, have entered business on their own behalf under the name of Egbert H. Farr & Company, Inc., with offices and warehouse at 2007 East Arizona street, Philadelphia. They will deal in paper manufacturers' supplies of all kinds.

Mr. W. W. Sayers of the Link-Belt Company has recently been promoted to the position of chief engineer of the company's Philadelphia works and eastern operations. Mr. Sayers has been with the Link-Belt for many years and during that time has made many personal friends as well as friends for the company among the trade in Chicago territory. His headquarters will be in Philadelphia.

Mr. C. H. Florandin who has a wide acquaintance among power plant engineers of New York and New Jersey, has arranged to represent the Perfection Grate and Supply Company of Springfield, Mass., manufacturers of hand stokers and soot cleaners. Mr. Florandin is at present New York representative of the Conveyors Corporation of America, Chicago, which company he will continue to represent.

Announcement is made of the opening of a new wholesale paper house under the name of Bermingham, Little & Prosser Company, located at 317-19 Southwest Boulevard, Kansas City, mo. This company is to occupy an entire building with an available 20,000 square feet of floor space. R. B. Little, vice president of the company, will be in charge of the house.

Power Specialty Company, builders of Foster superheaters, economizers and oil heating and cooling equipment announces the opening of new branch offices in Detroit, Mich., Dime Savings Bank Bldg., in charge of Mr. L. Lanyi, and also in Boulder, Colorado, 2324 Fourteenth St., in charge of Mr. R. B. Nutting, who was formerly Chicago District Manager.

The Hunter Pressed Steel Company has recently engaged Mr. R. R. Knapp as sales manager. Mr. Knapp is not unfamiliar with the products of the Hunter Pressed Steel Company, having sometime before sold many of their "Airspring" Grease Cups. Another move to keep up with a growing business has been an enlargement of their office building.

Mr. E. L. McCormack, superintendent of the St. Maurice Paper Company at Cap Madeleine, Que., has accepted a position as general superintendent of the St. Lawrence Paper Mills. A farewell banquet was given Mr. McCormack at which there were some forty guests, for whom there had been a splendid program prepared.

Ed. Silver, formerly tour boss at the Abitibi Power & Paper Company, Iroquois Falls, Ontario, has recently been appointed superintendent of their paper mill. Mr. Silver has been with this company for the past eight years and has displayed his ability to handle the position to which he has just been promoted.

Mr. R. L. Beers, formerly assistant chief engineer of the Underfeed Stoker Company of America, has recently been appointed chief engineer of the Detroit Stoker Company. Mr. Beers will have charge of the design and application of this company's Single Retort and Multiple Retort Underfeed Stokers.

Philip T. Dodge, president of the International Paper Company, with offices in New York, accompanied by Allan Curtis, vice president and head of the manufacturing department of the company, returned on November 14 from a tour of the papermaking countries of Europe.

James L. Coffey, former general sales manager of the Pictorial Paper Package Corporation of Aurora, Ill., has accepted a position as sales manager of the Milwaukee Paper Box Company of Milwaukee. The duties of Mr. Coffey's new connection started December first.

For many years the Link Belt Company has been issuing a large calendar. We are just advised that their 1923 calendar is about ready for distribution and that a number of extra copies are available. It measures 15½x24 inches and is attractively illustrated.

The Miller & Wright Paper Company, one of the large paper jobbing firms of New York City, has increased its capital stock from $50,000 to $400,000.

An inventory of the estate of the late Frank H. Milham, who was at the time of his death president of the Bryant Paper Company, Kalamazoo, Mich., shows that he left $838,027.64. By the terms of his will the entire estate is left to his wife and his daughter, Eleanor, share and share alike. A bequest of 2,000 shares of common stock in the Bryant Paper Company made to Mrs. Carolyn Demstaedt Hendrick and one of $5,000 to Dr. J. W. Bosman were, however, exceptions.

Harold E. Harris, previously the New Haven, Conn., representative of the Whitaker Paper Company, with headquarters in Boston, Mass., has been transferred to that company's New York branch at 48 Great Jones street.

The Beekman Paper and Card Company, Inc., one of the largest paper jobbing concerns in New York City, has filed notice of an increase in capital from $300,000 to $500,000.

C. B. Sievers, formerly of the J. E. Linde Paper Company, 84 Beekman street, New York, has rejoined the selling staff of that concern and is covering city territory.

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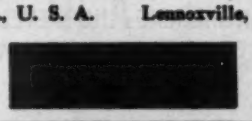

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Designs
Specifications
Valuations

New York, December 1, 1922.

THERE is much firmness in the paper market, and the industry in all its branches shows a very healthy tone and comparatively broad activity. There has been, of course, a slowing down of demand for some kinds of paper during the past few days, as is the usual thing toward the close of the year; on the other hand, demand for most descriptions of paper has been stimulated by the pre-holiday season and there is consequently even greater activity in these divisions of the trade than previously.

An encouraging development recently is that manufacturing costs have been so well adjusted in most paper mills that producers are now operating their plants at more profit than in a year or more or since the memorable boom after the war. Raw materials of many kinds have declined in price to some extent of late, which has automatically reduced the cost of making paper, while manufacturers in other cases have revised quotations on their own product to a sufficient degree to give them more leeway for profit under prevailing market conditions. It will be recollected that when improvement in the paper industry set in during the late summer most mills were caught with very little raw stock on hand; it was therefore necessary for them to increase their buying of pulp, rags, waste paper and other raw material, which ran prices on these commodities way up. In fact, raw material advanced much more rapidly than did finished paper, and manufacturers soon found themselves in a position where they were realizing but scant profit, or none at all, on their paper. This condition has now been corrected and it can be stated that the average paper mill is making a proportionately better profit on its output of paper today than in a long time.

Prospects for the industry in the forthcoming new year are highly favorable. Paper manufacturers should, from all present indications, enjoy a prosperous year in 1923, much better, in fact, than the current year. Consumption of paper of practically all kinds has gradually risen from the low point reached early this year until it is now running well above what was considered normal in pre-war days, and certainly there are at the moment no signs of any let-down in the use of paper. If anything, it appears as if a greater quantity of various kinds of paper will be consumed in this country next year than ever before. Many in the industry look for a record-breaking year as regards consumption, and it cannot be denied that consumption is at the bottom of any healthy period of prosperity for manufacturers, so that the coming year promises to be an active one with favorable manufacturing and marketing conditions for the paper industry.

A gratifying feature of the general business condition during the past several weeks is that the big interests of the country have attempted to put the brakes on the upward swing of prices of commodities—manufactured as well as raw products—and that as a result many of the basic industries of the nation exhibit a steadier and healthier tone than was the case a short time ago. Fortunately, manufacturers and merchants realized that prices were being allowed to climb too rapidly and, in at least some instances, too high, and, not desiring to see any period of inflation develop, concerted efforts have been made to check the trend toward inflation. Of course, the natural movement of prices of numerous manufactured articles during the pre-Christmas season is upward, and such is the case at present, but there are concrete signs that the efforts to keep prices of the basic products of the country within a healthy and economical limit have borne fruit. To say the least, this is very wise procedure on the part of producers and others controlling commodity prices. Warnings have been issued by economists and bankers that industry was headed toward inflation, and that the worst thing that could possibly happen to American business at this time was an inflation of prices and the creation of a fictitious demand for goods. Proof is not wanting now, however, that the important industries are settling down in a safe and sane position where prices are being gauged on the demand and the cost of production and where output is being confined to within the reasonable bounds dictated by consuming demand.

That the paper manufacturing industry is mainaining its revived activity is probably best shown by the latest Federal Trade Commission figures regarding paper production. Mill operations in September kept up on about the same scale as during the preceding month when a new high record of paper output for the present year was established. A total of 623,088 net tons of paper of all kinds was produced by United States mills in September, which was only a few thousand tons below the August output, and which was the biggest month's production of any month for the year with the exception of August. A favorable feature of the Commission's latest report is that mill stocks of paper continued to decline in September, stocks amounting to 249,516 net tons at the end of that month, compared with 264,480 net tons at the beginning of September. These figures show that manufacturers are finding a ready market not only for all of their current output but also a part of their surplus holdings of paper, and that month by month the statistical position of the market is steadily improving.

Production of print paper in the United States continued to gain in October as contrasted with September, a report just issued by the Federal Trade Commission on the print paper industry showing that 130,682 net tons of total newsprint was produced in October, against 125,402 net tons in September. Of this total output of print paper, 119,984 net tons were standard news, compared with 115,899 tons of standard news produced in September. October output of print paper was far above that in any October for five years past, and was not less than 14 per cent above an average for the past five years for total newsprint and 16 per cent above an average for standard news.

It is plainly observable that newsprint is still in a stronger market position than any other kind of paper. Consumption of print paper has attained new heights during recent weeks. With department stores advertising their holiday wares, with national advertising on the increase, and with the advertising movement otherwise gaining momentum, publishers are finding it necessary to print larger issues than they ever before put out. So big is the volume of advertising that many newspapers are obliged to omit columns of business in nearly every issue. It appears as if publishers have set a limit as to the size of their issues, presumably in the fear that if they do not conserve their supplies of paper they will run short, and therefore are refusing to print beyond a fixed number of pages. The New York dailies—both morning and afternoon—for example, are announcing in almost every issue that from five to thirty columns of advertising have been omitted because of lack of space, and this despite the fact that larger issues are being printed at present than ever in the past.

Most newsprint mills are sold up for the rest of the year and there is very little print paper to be had for spot delivery. Ordinarily the announcement by manufacturers that a reduction in the price of newsprint would be made on a stated date, such as has been fixed for January 1 next, would lead to a simmering down of demand, but just the opposite is the case in this instance. Publishers are scouring the market looking for spot lots of paper and are quickly absorbing any supply to be had within a reasonable length of time, contracts are being arranged for the coming year and it is said that in almost every case increased tonnage is wanted. At the price of $75 a ton set by leading manufacturing interests for standard newsprint, publishers seem willing to take all the paper they can get, and the marked activity that has developed in the print paper industry during the latter half of this year promises to continue all through 1923.

Book papers are in better demand with the movement constantly assuming larger proportions and with quotations stiffening. Coated book is especially firm in price, owing in part to the situation that has arisen in casein. Machine finished book paper is quoted at around 7 cents a pound, super book at 7.25 cents and coated book from 10.25 cents upward per pound. Wrappings and tissues are enjoying a lively pre-holiday season, with most mills sold out for the remainder of the year and with prices displaying more strength than in a lengthy period. Fine papers are moving well and at steady prices. Box boards have quieted down somewhat—a seasonable development—but quotations are maintained.

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Papermaking Rags

The trend of prices of many grades of papermaking rags has continued downward, and market levels in some instances are lower at present than have been recorded in some months, whereas other descriptions of rag stock have held steady at about last-reported levels. Changes in an upward direction during the past month have been rare, only in several cases —mostly involving new cuttings—where some particular kind of rag has not been in large enough supply to fill the wants of buyers have prices improved their position, whereas some rather sharp recession has occurred in most quarters of the market. Demand has slowed down to a pronounced degree, which is not an unusual development at this season because it is this time of the year when paper manufacturers let up in their purchasing of raw material while preparing for inventory-taking and thereby endeavor to keep stocks as low as their direct requirements will permit. At the same time, the market has not lacked activity. The movement of rags on back orders and long-term contracts has kept up in comparatively good volume, and here and there the market has had bright spots when some mill or group of mills have come into evidence as buyers on a fairly broad scale. Moreover, dealers throughout the country have offered much resistence to the decline of prices, contending that they were unable to replace stocks at lower costs and that therefore there was no incentive for them to reduce prices to effect sales, which has had at least some supporting influence on values.

The prevailing rag situation is very characteristic of this period of the year, though probably a little more accentuated because of the heavy importations of rags from European sources in recent months. There is no question but that a tremendous quantity of rag stock has been brought into the United States from outside sources during the past four or five months—the amount doubtless exceeding imports of any similar time in the past with the possible exception of the few months immediately following the resumption of rag exports from Europe following the late war. Invariably toward the end of November paper mills halt their buying of rags excepting such supplies as they actually and directly need, and this year they apparently were so well stocked by the middle of October that they were enabled to reduce their purchases sooner than ordinarily. Rags are a commodity which, unless they move freely, quickly decline in price, and it is consequently not surprising that market levels have dropped to the extent they have during the last few weeks of diminished trade activity. The very fact that prices have broken, and particularly on old rags, because of the slower demand is proof of the healthy condition of the market.

What is likely to develop during the next several months seems rather easy to anticipate provided no unforseen market developments occur. The probabilities are demand will continue small until after the turn of the year and probably for a month or so afterward, as reports generally state most paper mills are well supplied with rags over the next couple of months and as few paper manufacturers will seek to augment their stocks to any great extent until after inventories have been compiled. In the meantime, with prices on comparatively low levels, imports of rags will likely diminish as importers assert they cannot buy in Europe and bring stock into this country at a profit under the prices papermakers are now willing to pay. Domestic collections will also probably be reduced, partly because of the lower prices prevailing and partly because of winter weather hampering collection operations. Therefore, with these supply conditions existing, no further recession of moment in prices should be experienced although some grades may move down a bit more before the bottom is reached. Generally speaking, prices should hold fairly steady at about the levels ruling at present until demand from paper mills broadens along about February or March as it usually does. Then an upward movement of values may occur. Certainly there are good prospects for papermaking rags in the new year. The building program for 1923 is of even larger scope than that of this year, which will mean a heavy consumption of roofing and other building papers; the outlook for fine papers, for blotting papers, for book paper and for other kinds of paper made of rags is highly favorable, and this should lead to an additional large use of rag stock. Nevertheless, present indications are that a plentiful supply of rags will be afforded paper manufacturers in 1923 even though they should be called on to grant somewhat higher prices than at the moment obtain.

Dealers in new cuttings complain that clothing manufacturers are demanding stiff prices for cotton cuttings owing to the sharp rise in raw cotton and the resultant high cost of cotton piece goods; many clothing manufacturers feeling they should receive proportionate advances for their clippings. This in part explains the high prices asked of paper mills for new rags though demand for this class of stock has held up fairly well. No. 1 white shirt cuttings are quoted at 11.50 cents or higher per pound at dealers' shipping points, new unbleached muslin cuttings at 10.50 cents, light silesias at 7.75 cents, washables at 4.50 cents, and fancy shirt cuttings at 6.25 cents. Old white rags have eased off a little to around 6.50 cents for No. 1 repacked, and 4 cents for No. 2 repacked, and thirds and blues are slightly lower. Roofing stock is quoted at $1 upward a hundred pounds for No. 1 packing, and about 90 cents a hundred for the No. 2 grade. Foreign dark cottons have receided another couple of dollars per ton to around 1.05 cents a pound ex dock New York.

Average quotations f. o. b. shipping points and ex dock are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	11.50-12.00
White shirt cuttings, No. 2	6.00- 6.50
Fancy shirt cuttings	6.25- 6.50
Washables, No. 1	4.50- 4.75
Unbleached muslins	10.50-10.75
White lawns	10.00-10.25
Overall cuttings, blue	6.00- 6.50
Black silesias	5.75- 6.00
Light flannelettes	9.00- 9.25
Canton flannels, bleached	9.75- 10.00
Canton flannels, unbleached	8.50- 8.75
Shoe cuttings, bleached	8.50- 8.75
Shoe cuttings, unbleached	7.25- 7.50
Light silesias	7.75- 8.00
Linens, No. 1 white, foreign	13.00-14.00
Light prints, foreign	5.00- 5.25
Old Stock—	
Whites, No. 1, repacked	6.00- 6.50
Whites, No. 2 repacked	3.75- 4.25
Whites, house soiled	2.00- 2.15
Whites, street soiled	1.80- 1.90
Lace curtains	3.75- 4.00
Thirds and blues, rough	1.50- 1.65
Thirds and blues, repacked	2.00- 2.15
Black stockings	3.00- 3.25
Cotton canvas, No. 1	3.75- 4.00
White cotton batting	4.15- 4.35
Roofing, No. 1	1.00- 1.15
Roofing, No. 2	.90- 1.00
Dark colored cottons, foreign	1.00- 1.10
Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	9.00-10.00
Light prints, foreign	2.00- 2.25

Rope and Bagging

Despite a continuance of fairly good demand from paper mills for old rope, prices on this article have eased just a trifle, the decline approximating about a quarter of a cent per pound. The primary reason for the softening of prices is evidently that some large lots of old rope have recently been received from foreign sources, thereby permitting consumers to hold off in buying to some extent. However, there is a steady movement of supplies toward mills and buyers seem ready and willing to pay 6 cents or very close to this figure at dealers' shipping points for domestic manila rope in A1 condition, while foreign manila rope is fetching between

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5.50 and 5.75 cents per pound ex dock at Atlantic ports. The difference in prices on domestic and foreign ropes is merely a matter of quality of stock, foreign rope seldom measuring up in quality to that of domestic origin. Old mixed strings are selling with fair freedom at between 80 and 90 cents a hundred pounds at dealers' points.

Further deline has been noted in prices of roofing bagging, and offerings at 75 cents a hundred pounds and even lower elicit but slight response from felt mills at present. Old No. 1 scrap bagging is selling in routine amounts to regular consumers at prices ranging from 1.10 to 1.25 cents a pound f. o. b. shipping points, the higher figure being paid for specially sorted lightweight bagging for tissue paper manufacture. Gunny bagging is in fair demand and is holding in price.

F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.15- 1.25
Gunny, No. 1 foreign	1.10- 1.20
Scrap bagging, No. 1	1.10- 1.25
Roofing bagging	.70- .80
Wool tares, heavy	1.40- 1.60
Wool tares, light	1.30- 1.50
Manila rope, No. 1 foreign	5.50- 5.75
Manila rope, No. 1 domestic	5.75- 6.00
Sisal strings	1.25- 1.50
Mixed strings	.80- .90

Old Paper

After having ruled quiet and weak for some weeks, during which period prices moved downward almost without interruption, the market for old paper is showing a better undertone, and while no advancement has yet been scored, the recession in values appears to have been definitely checked and consumers are exhibiting greater buying interest. There is little question but that the railroad situation had a great deal to do with the sharp break in waste paper prices a month or so ago. Freight embargoes and the car shortage in the East badly hampered the normal movement of old paper from New York City and other large collection centers to consuming mills, and, as is always the case when waste paper fails to move freely, prices quickly weakened, the decline in some grades reaching as much as 50 per cent from the top levels prevailing in the late fall. Now the shipping situation is clearing to at least some extent and with packers disposing of their accumulations of waste paper with more facility, prices are showing a hardening tendency.

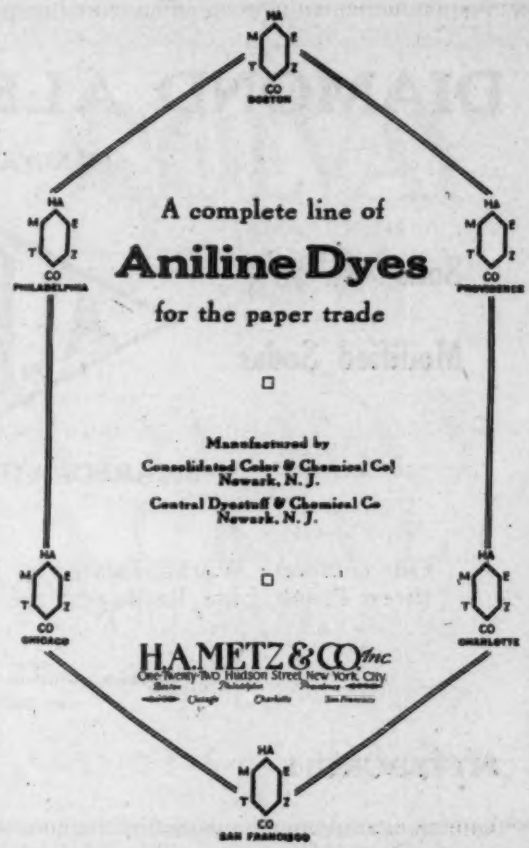
The decline in old paper values has been far greater in the low grades than in the better qualities, which seems to prove that the weakening of the market was due in large part to difficulties in effecting shipments to mills as packers probably have stored high grades pending more favorable transportation conditions while having let go of the low bulky grades for whatever they were able to realize. No. 1 mixed paper is at present quoted at between 80 and 90 cents a hundred pounds at shipping points, and old folded newspapers at 1.00 to 1.10 cents a pound, with reports stating that purchases have been affected in some cases in the East at below these levels. Books and magazines are selling at around 2.50 cents per pound for No. 1 heavy books, and 2.05 cents for crumpled books. Hard white shavings of No. 1 quality are quoted at 4.25 to 4.50 cents a pound, No. 1 soft white shavings at 3.60 to 3.75 cents, and ledger stock at 2.75 cents. Prices of old kraft paper have worked down to 2 cents per pound, and manila papers have eased off.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.25-4.50
Hard white shavings, Nos. 2-3	3.50-4.00
Soft white shavings	3.60-3.75
Colored shavings	1.50-1.75
Heavy book, No. 1	2.50-2.65
Crumpled book, No. 1	2.00-2.15
Ledger stock	2.75-2.85
Kraft, No. 1	2.00-2.15
Manilas, No. 1	1.60-1.75
White blank news	2.00-2.15
Over-issue news, No. 1	1.15-1.25
Folded news	1.00-1.10
Mill wrappers	1.00-1.10
Box board cuttings	.90-1.00
Mixed paper, No. 1	.80- .90
Common paper	.55- .65

Chemical Pulp

Quotations on domestic chemical wood pulp are well maintained and there is not much selling pressure exerted by



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BLEACHED SULPHITE

Made from spruce grown in the forests of Northern Maine.

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MANUFACTURERS OF

Soda Ash 58%

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Caustic Soda 76%

Special Alkalies

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producers and dealers nothwithstanding a pronounced slowing down of trade activity. Paper manufacturers have let up in their buying to a large extent, presumably owing to the approach of the year-end and the inventory period and also to recent heavy buying which probably has covered requirements for some time ahead. There is, however, a steady movement of supplies into consuming channels and of comparatively heavy volume. Reports say that a great majority of producers have disposed of their output for the balance of this year on contract, and pulp is being shipped regularly against these commitments as well as against back orders, deliveries on which have been delayed by railroad conditions.

There is at the moment no definite trend to prices. Sellers are doing what they can to hold up market levels and seem to have a sufficient part of their supplies sold not to warrant any price cutting to move additional lots of pulp, and while the upward swing of values has apparently been checked, there is no downward inclination in prices perceptible. Doubtless here and there consumers are securing limited amounts of pulp at slight concessions, but such instances are more of an exception than the general rule. Prices are just about holding their own, with producers for the most part seemingly satisfied to ship out such part of their output as they have sold and to conserve the remainder for future use.

Bleached sulphite is quoted at 5 cents per pound for No. 1 quality pulp, with quotations ranging a quarter of a cent on either side of this figure, depending on the quality of the pulp involved. Unbleached strong sulphite is selling at around 3 cents a pound, and news grade sulphite at 2.60 to 2.75 cents. Kraft pulp is steady at 3 to 3.25 cents for the No. 1 grade, and soda pulp is stationary at 4 to 4.25 cents per pound.

F. o. b. pulp mill quotations follow:

Bleached sulphite	4.75-5.25
Easy bleaching sulphite	3.00-3.25
Unbleached sulphite, No. 1	2.90-3.15
News grade sulphite	2.60-2.75
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.25-3.50
Kraft, No. 1	3.00-3.25
Screenings, refined	1.10-1.20

Mechanical Pulp

Ground wood is in a very strong market position. Probably no other kind of raw material used by paper manufacturers is marked by the firmness displayed by mechanical pulp, and prices on this commodity seem destined to go higher before the present upward movement of values is checked. One reason for the strength in the market is the bullish statistical position of ground wood; another is that demand is keeping up at a brisk pace with producers experiencing no little difficulty in filling the wants of buyers. Consumption of mechanical pulp, from all accounts, is in excess of normal, due to the active operations of news print and board mills, whereas current production is below an average. Moreover, grinders in numerous cases are conserving their stocks for their own use, thereby limiting the amount of pulp available in the open market. Domestic producers are reported easily securing $37 to $38 per ton at pulp mills for spruce ground wood for prompt shipment, and higher than these figures has been paid in some instances. Importers say they must get at least $40 a ton on the dock at New York or other American Atlantic ports for ground wood imported from Europe if they are to realize a profit over the prices demanded by manufacturers on the other side of the Atlantic. Even at this price offerings are of small tonnage, most importers quoting $41 or higher.

Chemicals

There is a fairly good demand for most of the chemicals used by paper and pulp manufacturers, with the movement of supplies of sufficient volume both on contract and to spot buyers to make for a moderately lively market. Casein is strongly quoted. The import duty of 2½ cents a pound imposed by the United States, and the increasing use of powdered milk are said to be reducing the available supply of casein, and 17 to 18 cents a pound is generally quoted on this article. Importers in frequent cases are reported asking 20 cents for casein for forward shipment from the Argentine. Bleaching powder is firm at between 1.75 and 2 cents a pound. and soda ash is priced at about 1.25 cents per pound. Brimstone is steady at $18 to $20 a long ton at the mines.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	3.50- 3.75
Bleaching powder	1.75- 2.00

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STANDARD IN SODA SINCE 1881

SOLVAY ALKALI

SODA ASH 58%
Contains 99+ %
Sodium Carbonate

CAUSTIC SODA 76%
Contains 97+ %
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for
Paper Manufacture

Manufactured by

The Solvay Process Company

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New York

Manufacturers of **Paper and Pulp Mill Machinery**

for constant hard service and economy
USE SOUTHWARK IMPROVED PULP PRESSES

Facts About This Press:

ALL steel construction except ram, which is chilled iron with ground working surface and outside packed.

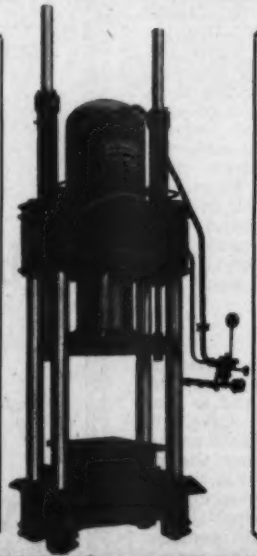
Pressing table is 33" wide by 46" long.

Stroke of ram is 48".

Equipped with Southwark two pressure three-way valves for controlling.

Either single or two pressure systems available.

Provided with bottom pressing table and improved drop track which eliminates manual control.



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Sulphite Presses
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Fisher Bldg.

SOUTHWARK
FOUNDRY AND MACHINE CO.
PHILADELPHIA, PA.

CLEVELAND
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New Papers

Writing—	
White rag	18-40
White sulphite No. 1	11-20
Colored rag	15-40
Ledger—	
White rag	18-50
White sulphite	13-25
Colored sulphite	11-20
Colored rag	13-50
Bonds—	
White rag	18-40
White sulphite	9-20
Colored sulphite	10-25
Colored rag	17-40
Book—	
No. 1 S. & S. C.	7.00- 7.50
Machine finished	6.75- 7.25
English finished	6.75- 7.25
Coated and enameled	10.25-12.00
Lithograph, M. F.	10.00-12.00
News Print—	
Rolls, contract	3.75-4.00
Rolls, transient	4.00-4.25
Sheets	4.25-4.50
Side runs	3.25-3.50
Cover stock—	
Coated, both sides	9.25-
Coated, one side	9.20-
Tissue—	
No. 1 white, 20x30	.85- .95
No. 2 white, 24x36	.75- .80
No. 1 manila, 24x36	.75- .80
Kraft	1.00-1.25
Wrappings—	
No. 1 Kraft	7.00-7.50
No. 2 Kraft	6.00-6.50
Boards—	
	New York and Chicago
Solid news	65.00-70.00
Straw	52.50-57.50
Plain chip	57.50-60.00
White coated chip	80.00-85.00
Manila coated chip	75.00-80.00
Binders' board	90.00-95.00

CHEMICALS—(Continued)

Brimstone (long ton, at mine)	18.00-20.00
Casein	17.00- ...
Caustic soda, spot delivery	2.60- 2.75
China clay, domestic washed	8.00- 10.00
China clay, foreign	15.00-22.00
Rosin, grade E	15.00-22.00
Satin white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.25- 1.35
Starch, papermakers', in bags	2.70- 2.80
Talc (ton)	14.00-17.00

Situation in Casein Alarming

During the past few months a situation has been developing in the casein market that demands prompt and serious consideration. During the past year this essential papermaking raw material has, by leaps and bounds advanced somewhat over 100 per cent and, what is more, it is now almost unobtainable at its present exalted price. Reports from various papermaking centers state that due purely to this situation the production of coated paper has been greatly curtailed. Paper mill men estimate that the increase in the price of casein adds a cent a pound to the cost of production of high grade coated papers.

This alarming situation in casein is due to two primary causes; First—a duty imposed on casein which has been considered for the past seven months and effective for three months has diverted the normal importations to other countries. Second—due to a greater profit in other by-products of skimmed milk, domestic production has not increased.

One solution of the problem, for the immediate future at least, seems to be the substitution of starch for casein in sizing of coated papers. This can be done without materially increasing the present cost of making coated paper.

Recommended Grades for Pulpwood

As the result of a series of conferences between pulp wood producers and purchasers, the Woodlands Section of the American Paper and Pulp Association has recommended the adoption of the following trades of spruce pulp wood for contract specifications for New York mills:

Grade No. 1

(a) Species — Spruce—not less than 80%; balance, Balsam.
(b) Sizes — 4 ft. lengths, with minimum top diameter of 5 in.
(c) Trimming and Piling — Sticks must be square-ended, with knots trimmed even with the body of the stick. They shall be piled close and straight, in accord with usual scaling practice. Knots over 2 in. in diameter will not be accepted.
(d) Rot — No rot accepted.

Grade No. 2

(a) Species — Spruce—not less than 60%. Balance, Balsam.
(b) Sizes — 4 ft. lengths, with minimum top diameter of 4 in.
(c) Trimming and Piling — As in Grade 1. Knots over 3 in. in diameter will not be accepted.
(d) Rot — Rot shall not exceed 5% of the quantity of wood involved. No single stick will be accepted if containing more than 25% rot.

Grade No. 3

(a) Species — Spruce—not less than 40%. Balance, Balsam.
(b) Sizes — 4 ft. lengths, with minimum top diameter of 3 in.
(c) Trimming and Piling — As in Grade 1. Knots over 4 in. in diameter will not be accepted.
(d) Rot — Rot shall not exceed 10% of the quantity of wood involved. No single stick will be accepted if containing more than 25% rot.

These grades were prepared by the New York Division of the Woodlands Section's Trade Customs Committee. W. S. Smith, of the Sherman Paper Company is Chairman of this New York Committee, which discussed these proposed grades very carefully with both producers and buyers for New York mills. Specifications are being similarly worked out for the other pulp wood regions of the United States.

Joint Cost and Sales Convention Proposed

The suggestion for a joint convention next spring of the Cost Association and the Salesmen's Association of the Paper Industry is an interesting proposition made by Thomas J. Burke, Secretary of the Cost Association of the Paper Industry, in a late bulletin of the Salesmen's Association to the paper salesmen of the country.

Mr. Burke points out that the cost of production dovetails into the sales question in every branch of the industry and adds that as sales agents sometimes at the mill see how paper is made, so the cost men of the industry should know something of the principles of salesmanship as practised at the selling end of the industry. He then says:

"I want to take advantage of this opportunity to make the suggestion that the Cost and Salesmen's Associations should hold a joint convention next Spring, and thus cement their understanding. After such a meeting, the members of these Associations should be better able to so direct their work that it may count to the best advantage for their respective organizations. In the meantime, inquiries from salesmen seeking information regarding cost methods will be most welcome."

EASTWOOD Wire Mfg. Co.

Fourdrinier Wires
Cylinder and Washer Wires

Belleville, New Jersey
U. S. A.

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Valves, Unions, Cocks, Fittings, Digester Parts, Castings, etc., for Sulphite Mills from Our Perfection Bronze

Stickle Compound Condensing System
and Automatic Steam Control
for Paper Machines

As shown in the folder we sent out to the mills—*"How to Dry Paper"*—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you. We guarantee a saving of 20 per cent in steam consumed for this purpose.

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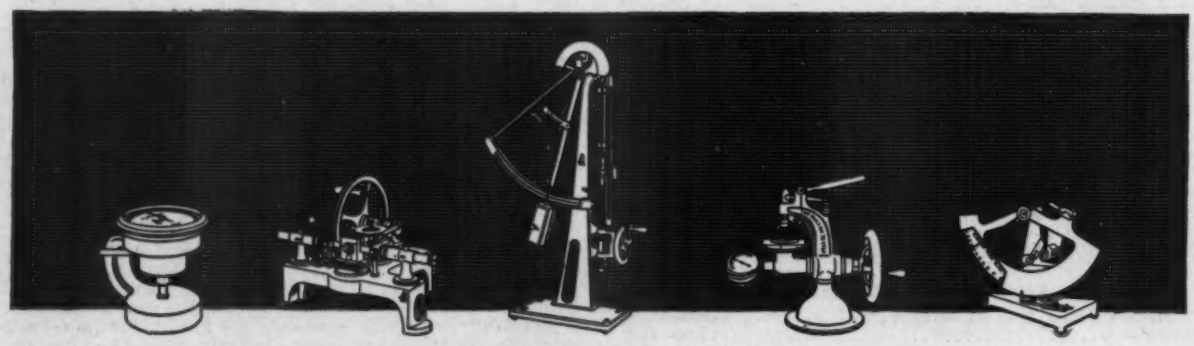
Boston Philadelphia



It Shows Up in the Tests!

NO STAGE in the paper-making process is more important to the finished result than the formation of the sheet of pulp on the Fourdrinier Wire.

Strength, endurance and uniformity—all are involved in the ability of the Fourdrinier Wire to distribute the pulp in an even, unvarying layer over its entire length and width.

High test paper cannot be made on an inferior wire. To assure high quality paper, the wire must be of accurate, uniform mesh; it must be free from wrinkles; it must run straight and true.

Tyler Fourdrinier Wires, because of the firm weaving, accurate mesh and ability to run straight and true, insure the quality of the paper from the standpoint of the Fourdrinier Wire.

Tyler Fourdrinier Wires are woven in all widths up to and including 250 inches.

Send for Samples

THE W. S. TYLER COMPANY, Cleveland Ohio

Manufacturers of Fourdrinier Wires, Cylinder Faces, Washer Wires and Corduroy Cloth

Wood Pulp

As is usually the case during the final weeks of the year, demand for wood pulp has subsided to some extent and the market at present exhibits more quietness than in quite a while. Paper manufacturers, presumably having covered their requirements for a time through recent fairly heavy purchases, and anxious to keep their stocks down for inventories, are paying less attention to pulp than in probably four or five months. The market is not without its redeeming features, however. Importers in general have contracts for large amounts of pulp on their books, which absorb most of the supply being received from primary European sources, and there is still a moderate business transpiring in spot lots of pulp needed by consumers for filling-in purposes and against orders for paper they did not anticipate.

Shipments from Scandinavian and other foreign sources continue to arrive at American ports in large tonnage. The latest available figures show that imports of chemical pulp into this country in September amounted to 71,748 net tons, which were slightly less than the imports of 83,563 net tons in the preceding month, and also under the 90,637 tons imported in July. October and November arrivals promise to set new high import figures for the year, judging from unofficial reports of receipts at Atlantic ports during the past two months, and since it is known the Swedes are rushing out all the pulp they can find shipping space for prior to the closing of the Baltic for the winter. A gratifying feature of these heavy importations is, however, that most of the pulp coming in from outside sources has been sold to paper mills; therefore the large arrivals have little or no influence on market prices.

Reports from abroad generally tell of producers in the Scandinavian countries, in Germany and in Finland being well sold up, most of the supply in these primary sources having been contracted for during the next few months. Moreover, prices are firm in Europe, and importers say that this factor alone should serve to hold up market levels in the United States even should demand for foreign pulps recede further. There have been occasions lately where here and there spot lots of sulphite or kraft pulp have been offered at reductions from the top prices reached a month or so ago, but there has been no concerted marking down of quotations. Importers are mostly of the opinion that the present lull in demand is but temporary, due to the approaching end of the year and reaction after a period of heavy buying, and that paper mills will resume the purchase of raw material on a broader scale soon after the turn of the year.

Bleached sulphite of No. 1 quality is quoted at 4.50 to 4.75 cents per pound ex dock New York or other American Atlantic ports, with the latter figure about the highest consumers will agree to pay at the moment and with most spot buying at the lower price. Unbleached sulphite of No. 1 grade is bringing around 2.90 cents a pound on the dock, and easy bleaching from 3 cents upward. Kraft of No. 1 quality is just a trifle down in price, between 2.80 and 2.90 cents being commonly paid for Scandinavian kraft ex dock New York. Foreign ground wood is strongly quoted at $40 to $41 a ton.

Receipts at the port of New York in November and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$ 4.50-$ 4.75
Unbleached sulphite, No. 1	2.85- 3.00
Easy bleaching	3.00- 3.25
Mitscherlich unbleached	3.00- 3.25
Kraft	2.80- 3.00
Ground wood, per ton	40.00- 42.00

Castle, Gottheil & Overton, 410 bls. from Hamburg and 954 bls. from Rotterdam; Dill & Collins, 7,659 bls. from Woodfibre; Johaneson, Wales & Sparre, 1,000 bls. from Norrkoping, 12,240 bls. from Sikea and 5,236 bls. from Gothenburg; American Woodpulp Corp., 360 bls. from Sikea; Scandinavian-American Trading Co., 3,000 bls. from Harnosand, 600 bls. from Sikea, 508 bls. from Gothenburg and 1,000 bls. from Copenhagen; Craig-Becker Co., 21,263 bls. from Gaspe; Bulkley, Dunton & Co., 6,875 bls. from Bremen; A. J. Pagel & Co., 6,000 bls. from Harnosand, 2,850 bls. from Husum and 300 bls. from Gothenburg; J. Anderson & Co., 2,700 bls. from Greaker and 375 bls. from Gothenburg; E. M. Sergeant & Co., 775 bls. from Greaker, 3,563 bls. from Gothenburg and 600 bls. from Copenhagen; E. Naumberg & Co., 1,800 bls. from Bremen, 4,000 bls. from Sebenico, 1,040 bls. from Gothenburg and 600 bls. from Hamburg; Seggerman Bros., 2,200 bls. from Gothenburg; C. B. Richard & Co., 40 bls. from Hamburg; Irving National Bank, 4,480 bls. from Kotka and 654 bls. from Helsingfors; Guaranty Trust Co., 2,700 bls. from Sikea, 1,600 bls. from Bremen and 1,000 bls. from Gothenburg; Central Union Trust Co., 1,500 bls. from Greaker; Bankers Trust Co., 66 bls. from Hamburg; National City Bank, 2,640 bls. from Bremen; J. H. Acer & Co., 4,288 bls. from London; H. Hollesen, 2,200 bls. from Bremen and 2,648 bls. from Hamburg; Mechanics and Metals National Bank, 1,250 bls. from Norrkoping and 508 bls. from Gothenburg; Woodpulp Trading Co.. 2,000 bls. from Gothenburg; International Acceptance Bank, 2,000 bls. from Gothenburg; R. F. Hammond, 500 bls. from Gothenburg; American Exchange National Bank, 150 bls. from Bergen; Kidder, Peabody & Co., 10,000 bls. ground wood from Bergen; Price & Pierce, 800 bls. from Gothenburg; M. Gottesman & Co., 940 bls. from Rotterdam; E. J. Keller Co., 2,326 bls. from Bremen; Nilsen, Lyon & Co., 1,250 bls. from Hamburg; E. Butterworth & Co., 12 bls. from Christiania; Order, 300 bls. from Hamburg, 1,510 bls. from Gothenburg, 6,290 bls. from Port Alice and 1,500 bls. from Gefle.

Paper Stock

There has been a pronounced slowing down of demand for imported papermaking materials and yet arrivals from foreign sources continued large in November, the bulk of the supply imported last month evidently being on back orders and contracts. Rag imports were particularly heavy, and there were considerable quantities of old rope, bagging and waste paper brought in. Most of the rags imported were of roofing paper quality, large shipments of these reaching American ports from various European countries.

Receipts at the port of New York in November follow:

Old Rope

E. J. Keller Co., 71 coils from London and 85 coils from Hull; Katzenstein & Keene, 23 bls. from Barcelona; Ellerman-Wilson S. S. Lines, 27 coils from Southampton and 138 coils from London; United States S. S. Lines, 58 coils from Bremen; Brown Bros. & Co., 131 coils from Hull, 375 coils from Bristol, 110 coils and 74 bls. from Antwerp, and 169 bls. and 26 coils from Rotterdam; N. E. Berzen, 42 coils from Havana; W. Schall & Co., 62 bls. from Barcelona; Ladenburg, Thalman & Co., 76 coils from Rotterdam and 152 bls. from Havre; Maurice O'Meara Co., 135 coils from Antwerp; Mechanics & Metals National Bank, 88 coils from Leith; Golman, Sachs & Co., 187 coils from Leith; Stone Bros. & Sherwin Co., 128 bls. from Havre; H. F. Reed, 76 coils from Bergen; American Exchange National Bank, 455 bls. from Bremen; Chemical National Bank; 81 coils from Bremen; Order, 35 bls. from Barcelona, and 163 coils and 18 bls. from Rotterdam.

Old Bagging

E. Butterworth & Co., 93 bls. from Rotterdam and 346 bls. from Antwerp; British Bank of South America, 98 bls. from Liverpool; American Exchange National Bank, 530 bls. from Antwerp; International Bag Co., 60 bls. from Bristol; E. J. Keller Co., 763 bls. from Antwerp; 55 bls. from Manchester and 110 bls. from London; S. Birkenstein & Sons, 99 bls. from London; Irving National Bank, 68 bls. from Manchester; Katzenstein & Keene, 25 bls. from Manchester; Equitable Trust Co., 146 bls. from Manchester; Castle, Gottheil & Overton, 61 bls. from Antwerp.

Rags

Katzenstein & Keene, 395 bls. from Barcelona, 337 bls. from Bordeaux and 138 bls. from Rotterdam; M. Wolfer &

The Pulp and Paper Trading Co.
21 East 40th Street New York City

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Quality: It means more than price

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"Hafslund Bear"
"Forshaga"
Bleached Sulphite
"Klarafors"
Easy Bleaching Sulphite
Strong Unbleached Sulphite

PULP

"Hurum"
"Bamble"
Extra Strong Kraft; Bleached and Bleachable Sulphate
"Edsvalla" 50% Moist
"Dejefors" Dry
White Spruce
Ground Wood

Tonnages available on dock for prompt shipment

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SOLE SELLING AGENTS
for Bathurst Pulp

Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

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INCORPORATED
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FOREIGN AND DOMESTIC
PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
COTTON, JUTE AND FLAX WASTES
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MANUFACTURERS OF
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ANIMAL SIZING GLUE STOCK

LARGEST SPECIALISTS IN AMERICA ON
FINE WRITING PAPER SIZING

E. F. RUSS COMPANY 201 Devonshire S. BOSTON, U. S. A.

Co., 35 bls. from Havana; American Woodpulp Corp., 96 bls. from Rotterdam, 701 bls. from Antwerp and 156 bls. from Bordeaux; P. Berlowitz, 232 bls. from Rotterdam and 436 bls. from Bremen; R. Wolf, 91 bls. from Rotterdam; Castle, Gottheil & Overton, 1,125 bls. from Rotterdam and 419 bls. from Antwerp; E. J. Keller Co., 849 bls. from Havre, 159 bls. from Hamburg, 145 bls. from Bordeaux, 234 bls. from Rotterdam, 523 bls. from Newcastle, 114 bls. from Bergen and 674 bls. from Antwerp, etc.

Miscellaneous Paper Stock

Guaranty Trust Co., 96 bls. from Glasgow; Brown Bros. & Co., 154 bls. from Glasgow, 66 bls. from Belfast, 473 bls. from Dublin and 49 bls. from Manchester; Irving National Bank, 1,295 bls. from Antwerp, 70 bls. from Glasgow, 101 bls. from Bordeaux and 48 bls. from Hamburg; Equitable Trust Co., 358 bls. from London, 57 bls. from Dundee, 135 bls. from Leith, 273 bls. from Bristol, 73 bls from Liverpool and 63 bls. from Manchester; E. J. Keller Co., 53 bls. from Hamburg and 381 bls. from Antwerp; Bank of New York, 53 bls. from Liverpool and 35 bls. from London, etc.

Paper

The import trade of the United States in paper in November continued to be featured by large arrivals of kraft wrapping paper from Sweden, receipts of this kind of paper from European sources last month probably exceeding any single month's imports of wrapping paper in the past. There were also fair-sized shipments of print paper, notably newsprint from Germany. Latest Government statistics show that imports of newsprint into the U. S. in September from all sources excepting Canada totaled 10,566 net tons, of which 5,900 tons or about half the total came from Sweden, and 2,057 tons from Germany, compared with 14,484 net tons imported from similar sources in September, 1921. Usual amounts of cigarette, hanging, filter and drawing papers were imported last month. Arrivals at the port of New York in November follow:

Cigarette

American Tobacco Co., 2,960 cs. from Bordeaux; Rose & Frank Co., 110 cs. from Havre; R. J. Reynolds Tobacco Co., 660 cs. from St. Nazaire; British-American Tobacco Co., 238 cs. from Liverpool; P. J. Schweitzer, 132 cs. from Marseilles; Surbrug Co., 54 cs. from Havre; De Manduit Paper Corp., 425 cs. from Havre and 95 cs. from Marseilles; Kaufman Bros. & Bondy, 12 cs. from Bordeaux; Hard & Ritter, 10 cs. from Barcelona; Order, 87 cs. from Marseilles.

Printing

Bankers Trust Co., 255 rolls from Hamburg and 177 rolls from Gothenburg; Chemical National Bank, 663 rolls from Rotterdam, 132 rolls from Bremen and 1,086 rolls from Hamburg; National City Bank, 161 rolls from Bergen and 751 rolls from Christiania; Ironbound Trust Co., 126 rolls from Gothenburg; F. B. Vandegrift & Co., 178 cs. from Hamburg; L. A. Consmiller, 485 cs. from Rotterdam; Ekman Export Co., 1,629 rolls from Bremen; Street & Smith Publishing Co., 426 rolls from Bremen and 801 rolls from Rotterdam; B. F. Drakenfeld & Co., 62 cs. from Liverpool; Ladenburg, Thalman & Co., 684 rolls from Hamburg; Parsons & Whitemore, 1,926 rolls from Bremen; J. B. Harris & Co., 95 rolls from Bremen; Bulkley, Dunton & Co., 312 rolls from Bremen; New York Journal of Commerce, 221 rolls from Bremen; Watch Tower Bible and Tract Co., 114 rolls from Bremen; New York Tribune, 422 rolls from Bremen; Newark Star Publishing Co., 630 rolls from Rotterdam; H. Lips, 252 cs. from Antwerp; M. G. Lange & Co., 15 cs. from Bremen; C. Steiner, 90 cs. from Bremen; C. L. Robinson, 1,253 rolls from Gothenburg; J. H. Scott, 113 rolls from Antwerp; M. Gottesman & Co., 18 rolls from Bergen; C. K. MacAlpine, 130 rolls from Gothenburg; Fernstrom Paper Co., 46 rolls from Hamburg and 1,705 rolls from Gothenburg; H. Coman, 36 rolls from Bremen; Oxford Univeristy Press, 6 cs. from Liverpool; Redden & Martin, 42 rolls from London; A. G. Nelson Paper Co., 169 rolls from Rotterdam; W. Wrigley & Co., 10 cs. from London; Order, 9,801 rolls from Bremen, 2,173 rolls from Hamburg, 566 rolls from Gothenburg, 1,089 rolls from Bergen, 35 rolls from Antwerp, 304 rolls from Christiania and 35 rolls from London.

Wrapping

Equitable Trust Co., 150 bls. and 264 rolls from Copenhagen, 21 bls. from Gothenburg, 75 bls. from Bremen and 54 bls. from Hamburg; Bank of America, 92 bls. and 681

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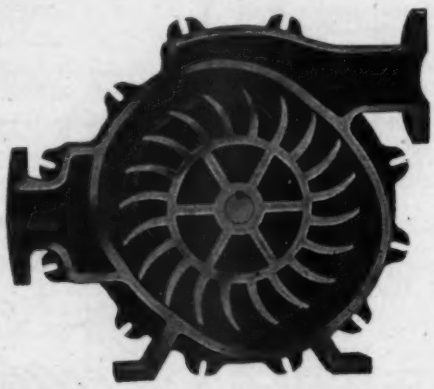

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Hanging

W. H. S. Lloyd & Co., 43 bls. from London; A. C. Dodman, 97 bls. from Liverpool, 27 bls. from Southampton and 9 cs. from Antwerp; R. F. Downing & Co., 8 bls. from London; J. W. Hampton, Jr., & Co., 1,066 bls. from Bremen; A. Murphy & Co., 18 bls. from Hamburg, 2 bls. from Southampton, 3 bls. from Havre and 9 bls. from Liverpool; National City Bank, 536 bls. from Antwerp; Guaranty Trust Co., 796 bls. from Rotterdam; A. Diament & Co., 3 cs. from Havre; Order, 9 cs. and 2,659 rolls from Antwerp.

Writing

Black, Starr & Frost, 2 cs. from Havre; C. Steiner, 20 cs. from Bremen; Louis DeJonge & Co., 65 cs. from Marseilles; American Express Co., 2 cs. from Antwerp; R. H. Macy & Co., 2 cs. from Antwerp; Order, 26 cs. from Antwerp.

Drawing

Lunham & Moore, 29 cs. from London; Keuffel & Esser Co., 39 cs. from Hamburg; E. Dietzgen & Co., 1 cse. from Havre; Order, 9 cs. from Hamburg.

Filter

J. Manheimer, 70 bls. from Havre; Lunham & Moore, 29 cs. from Southampton and 20 cs. from London; E. Fougera & Co., 145 cs. from Southampton and 40 cs. from Bordeaux; A. Giese & Sons, 30 bls. from Bordeaux; C. G. Euler, 32 bls. from Bordeaux; G. Lueders & Co., 4 cs. from Havre; Bernard, Judae & Co., 40 bls. from Bordeaux; E. Dietzgen & Co., 12 cs. from Hamburg.

Tissue

R. Hoe & Co., 1 ble. from London; American Express Co., 4 cs. from Liverpool; F. C. Strype, 29 cs. from Liverpool; Wilkinson Bros. & Co., 10 cs. from Liverpool; American Merchants Shipping & Forwarding Co., 25 cs. from Hamburg.

Photo

Gevaert Co. of America, 40 cs. from Antwerp; Defender Photo Supply Co., 49 cs. from Antwerp; M. G. Lange & Co., 1 cse. from Hamburg.

Boards

Bendix Paper Co., 20 cs. from Bremen and 175 cs. from Hamburg; Pulp and Paper Trading Co., 618 rolls from Rotterdam; A. Vrydek, 485 rolls from Rotterdam; Buschmann Bros., 314 rolls from Rotterdam; F. G. Prager & Co., 31 cs. from Bremen; Metropolitan Import & Mfg. Co., 49 cs. from Hamburg and 5 cs. from Bremen; O. G. Hempstead & Sons, 17 cs. from Hamburg; Wiebush Calender Importing Co., 20 cs. from Hamburg; Lagerloef Trading Co., 2,264 bls. from Hamburg; Wilkinson Bros. & Co., 24 rolls from Gothenburg; F. J. Scanlan, 102 cs. from Havre; Irving National Bank, 500 bls. from Rotterdam; F. H. Kretchmann, 13 cs. from Hamburg.

Miscellaneous

Bird & Wachenheim, 200 bls. from Bremen and 9 cs. from Havre; A. Frankan & Co., 9 cs. from Hamburg; Quality Art Novelty Co., 50 cs. from Hamburg; F. L. Kraemer & Co., 33 cs. from London and 15 cs. from Hamburg; Louis DeJonge & Co., 68 cs. from Marseilles; Whiting-Patterson Co., 10 cs. from Havre; Hensel, Bruckmann & Lorbacher, 87 cs. from Hamburg; Baer Bros., 8 cs. from Bremen; Japan Paper Co., 9 cs. from Havre, 17 cs. from Gothenburg and 11 cs. from Rotterdam; Coenca-Morrison Co., 21 bls. from Hamburg; Gallagher & Ascher, 10 cs. from Hamburg; C. H. Boulin, 41 cs. from Havre.

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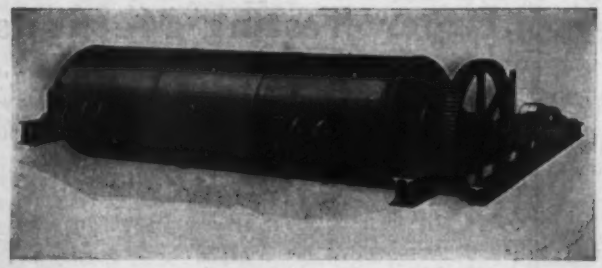

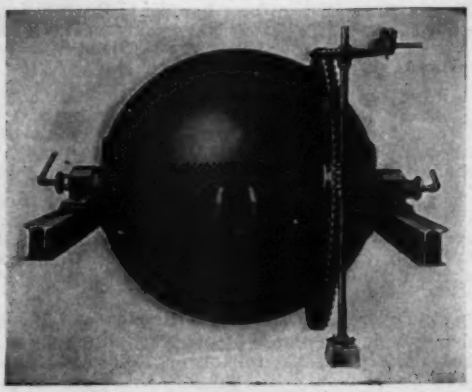

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Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

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E. F. Russ Co., Boston.

ACID RESISTING BRONZE
Eastwood Wire Mfg. Co., Belleville, N. J.
William A. Hardy & Sons, Fitchburg, Mass.

ACID RESISTING PAINT
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.

AGITATOR EQUIPMENT
Moore & White Co., Philadelphia.

AIR COMPRESSORS
Hooven, Owens, Rentschler Co., Hamilton, O.

AIR CONDITIONING AND CONTROL APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

ALKALI
Diamond Alkali Co., Pittsburgh.
Wing & Evans, New York City.

ANGLE VALVES
The Crane Company, Chicago.
Eastwood Wire Mfg. Co., Belleville, N. J

ARCHITECTS
James L. Carey, Chicago.
Ferguson Engineers, Chicago.
Hardy S. Ferguson, New York City.
George F. Hardy, New York City.
V. D. Simons, Chicago.
Jos. H. Wallace & Co., New York City.

ASH CONVEYORS
Green Eng. Co., East Chicago, Ind.

ASSORTING TABLES
Moore and White Co., Philadelphia.

BABBITT METAL
The Paul R. Brown Co., New York City.

BAKELITE GEARS
D. O. James Mfg. Co., Chicago.

BALL CHECK VALVES
The Draper Mfg. Co., Port Huron, Mich.

BALLS (Brass)
The Draper Mfg. Co., Port Huron, Mich.

BALLS (Iron and Steel)
The Draper Mfg. Co., Port Huron, Mich.

BANDLESS ROLLS
Valley Iron Works Co., Appleton, Wis.

BARKERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

BEARINGS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

BEARINGS (Ball)
S. K. F. Industries, New York City.

BEATER BARS (Bronze)
American Manganese Bronze Co., Philadelphia.

BEATER ROLL FILING
Taylor Wharton Iron & Steel Co., Highbridge, N. J.

BEATING, WASHING AND BLEACHING ENGINES
Dayton Beater & Hoist Co., Dayton, O.
Holyoke Machine Co., Holyoke, Mass.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

BEATERS (Continuous)
Claflin Engineering Co., Lancaster, O.

BELT DRIVES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
The Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.
T. B. Wood's Sons Co., Chambersburg, Pa.

BELTING (Rubber)
B. F. Goodrich Rubber Co., Akron, O.

BELTING (Silent Chain)
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.

BELT LACING
Flexible Steel Lacing Co., Chicago.

BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

BLEACHING POWDER
Pennsylvania Salt Mfg. Co., Philadelphia.

BLEACHING (Propellers)
Moore and White Co., Philadelphia.

BLEEDER TURBINE
Moore Steam Turbine Corp., Wellsville, N. Y.

BLOWERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Moore Steam Turbine Corp., Wellsville, N. Y.
J. O. Ross Eng. Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

BLOW-OFF VALVES
Henry Horkman, Neenah, Wis.

BOARD MACHINES
Beloit Iron Works, Beloit, Wis.
Black-Clawson Co., Hamilton, O.
Valley Iron Works, Appleton, Wis.

BOILERS
J. F. Davis, Chicago.

BOILERS (Electric)
Electric Furnace Con. Co., Philadelphia.

BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, O.
W. S. Tyler Co., Cleveland, O.

BRICK AND CONCRETE PAINT
Detroit Graphite Co., Detroit, Mich.

BRIMSTONE
Union Sulphur Co., New York City.

BRONZE CASTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.

BUCKETS (Elevator)
Hendricks Mfg. Co., Carbondale, Pa.
Robins Conveying Belt Co., New York City.
Stephens-Adamson Mfg. Co., Aurora, Ill.

CALENDERS
Beloit Iron Works, Beloit, Wis.
Holyoke Machine Co., Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.
Smith & Winchester Mfg. Co., So. Windham, Conn.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N. Y.

CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.

CASEIN
Casein Mfg. Co., New York City.

CASTINGS (Iron & Brass)
Smith & Winchester Mfg. Co., So. Windham, Conn.

CASTINGS (Brass and Bronze)
Eastwood Wire Mfg. Co., Belleville, N. J.

CASTINGS (Grey Iron)
Nordberg Mfg. Co., Milwaukee, Wis.
Robins Conveying Belt Co., New York City.

CAST IRON PIPE
American Cast Iron Pipe Co., Birmingham, Ala.

CAUSTIC SODA
Diamond Alkali Co., Pittsburgh.
Edw. Hill's Son & Co., New York City.
Wing & Evans, Inc., New York City.

CEMENT
Smith & Winchester Mfg. Co., So. Windham, Conn.

CEMENT PAINT
Detroit Graphite Co., Detroit, Mich.

CENTRIFUGAL PUMPS
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
E. M. Cross Mach. Co., Berlin, N. H.
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

CHAIN DRIVES
Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.

CHAIN GRATES
Green Eng. Co., East Chicago, Ind.

CHEMICALS
Diamond Alkali Co., Pittsburgh.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., New York City.
Merrimac Chemical Co., Boston.
Wing & Evans, Inc., New York City.

CHIMNEYS (Metal)
Littleford Bros., Cincinnati, O.

CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Union Iron Works, Bangor, Me.
Valley Iron Works Co., Appleton, Wis.

CLAYS AND FILLERS
Daniel M. Hicks, New York City.
Miner-Edgar Co., New York City.
Richardson Co., John, Boston.

CHLORINE (Liquid)
Mathieson Alkali Wks., Inc., New York City.

COAL BUNKERS
The Brownhoist Co., Cleveland, O.

COAL CRUSHERS
Orton & Steinbrenner Co., Chicago.

COAL & ASH HANDLING SYSTEMS
The Brown Hoisting Mach. Co., Cleveland, O.
Link Belt Co., Chicago.

COATED PAPERS
Watervliet Paper Co., Watervliet, Mich.

CONCRETE FLOOR HARDENER
Detroit Graphite Co., Detroit, Mich.

CONCRETE PAINT
Detroit Graphite Co., Detroit, Mich.

CONDENSERS
Nordberg Mfg. Co., Milwaukee, Wis.

CONSULTING ENGINEERS
James L. Carey, Chicago.
Hardy S. Ferguson, New York City.
Ferguson Engineers, Chicago.
George F. Hardy, New York City.
V. D. Simons, Chicago.
Jos. H. Wallace & Co., New York City.

CONSULTING ENGINEERS (Power)
R. M. Baxter, Cleveland.
Ferguson Engineers, Chicago.
V. D. Simons, Chicago.

CONTRACTORS (Building)
The Austin Co., Cleveland, O.

CONVEYORS
The Brown Hoisting Mach. Co., Cleveland, O.
Link Belt Co., Chicago.
Stephens-Adamson Mfg. Co., Aurora, Ill.

CONVEYORS (Belt)
Robins Conveying Belt Co., New York City.

CORDUROY WIRE CLOTH
The W. S. Tyler Co., Cleveland, O.

CORES (Collapsible)
Smith & Winchester Mfg. Co., So. Windham, Conn.

CORLISS ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.

COUNTERS (Revolution)
The Foxboro Co., Inc., Foxboro, Mass.

COUPLINGS
The Falls Clutch & M. Co., Cuyahoga Falls, O.

COUPLINGS (Shaft)
T. B. Wood's Sons Co., Chambersburg, Pa.

CRANES (Auto)
The Byers Mach. Co., Ravenna, O.

CRANES (Crawling Tractor)
The Brown Hoisting Mach. Co., Cleveland, O.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago.

CRANES (Dipper Arm)
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago.

CRANES (Locomotive)
Brownhoist Co., Cleveland, O.
Link Belt Co., Chicago.
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago.

CRANES (Overhead)
Northern Engineering Works, Detroit, Mich.

CREOSOTING CYLINDERS
Biggs Boiler Works Co., Akron, O.

CRUSHERS (Coal and Coke)
Robins Conveying Belt Co., New York City.

CUTTERS
Smith & Winchester Mfg. Co., So. Windham, Conn.

CYLINDER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

CYLINDER MOLDS (New or Repaired)
Appleton Wire Works, Appleton, Wis.
Beloit Iron Works, Beloit, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Glens Falls Machine Works, Glens Falls, N. Y.
The Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, O.
Wisconsin Wire Works, Appleton, Wis.

DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Central Mfg. Co., Kalamazoo, Mich.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, O.

DIE PRESSES
Smith & Winchester Mfg. Co., So. Windham, Conn.

DIESEL ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.

DIGESTERS
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.
Manitowoc Eng. Works, Manitowoc, Wis.

DIGESTER COVERS
Eastwood Wire Mfg. Co., Belleville, N. J.

DRAFT GAUGES
The Foxboro Co., Foxboro, Mass.

DRUM WINDERS (Drives)
Beloit Iron Works, Beloit, Wis.
Ticonderoga Machine Co., Ticonderoga, N. Y.

DRYERS
Smith & Winchester Mfg. Co., So. Windham, Conn.

DRYERS (Roller)
The Coe Manufacturing Co., Painesville, O.

DRYERS (Rotary)
Biggs Boiler Works Co., Akron, O.

DRYER EXHAUST
Nash Engineering Co., So. Norwalk, Conn.

DRYER FELTS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Lockport, N. Y.
Shuler and Benninghofen, Hamilton, O.

DRYING MACHINES
The H. P. Coe Dry Mach. Corp., New York City.

DRYING SYSTEMS
J. O. Ross Eng. Corp., New York City.

DYESTUFFS
E. I. Du Pont de Nemours & Co., Wilmington, Del.
H. A. Metz & Co., Inc., New York City.
National Aniline & Chem. Co., New York City.
The Newport Chemical Works, Inc., Passaic, N. J.
Standard Ultramarine Co., Huntington, W. Va.
Sandoz Chemical Works, New York City.
The White Tar Aniline Corp., New York City.

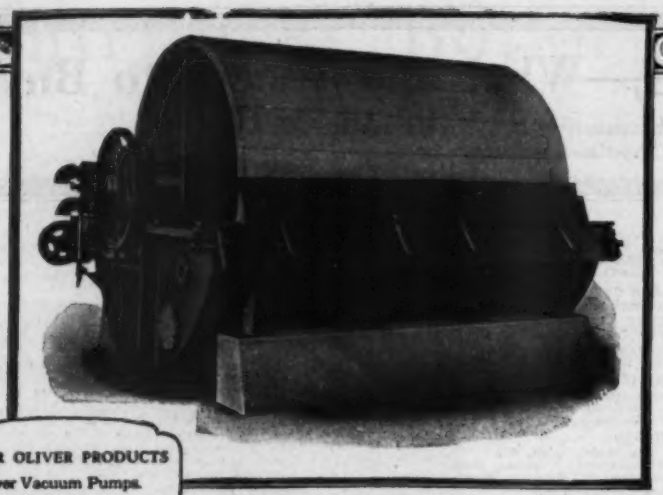
DUST COLLECTING SYSTEMS
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.

ELECTRIC HOISTS
Link-Belt Co., Chicago.
Northern Engineering Co., Detroit, Mich.

ELECTRIC STEAM GENERATORS AND BOILERS
Electric Furnace Construction Co., Philadelphia.

ELECTRICAL MACHINERY
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa

ELEVATORS
The Brown Hoisting Mach. Co., Cleveland, O.
Link Belt Co., Chicago.



Why the OLIVER is supplanting the washing-pit

OTHER OLIVER PRODUCTS
Oliver Vacuum Pumps.
Oliver Air Compressors.
Oliver Centrifugal Pumps.
Oliver Worm Gear Speed Reducers.
Olivite Acid-Proof Centrifugal Pumps.

Olivers are supplanting other systems for washing soda or kraft pulp, because they wash more efficiently and effect important economies which quickly pay the cost of the Oliver installation.

Pulp is washed in a thin sheet instead of in a mass several feet thick, thus securing direct contact of the wash water with every particle of fibre. A thorough and uniform displacement of cook liquor is secured automatically, insuring a non-variable output at a uniform rate.

Installation costs of Oliver Filters are lower than for either diffusers or pan stations. A filter with 100 sq. ft. of cloth area handles 25 to 30 tons in 24 hours.

Our extensive experience is at your disposal without obligation. Let us help you reduce your wash-room costs.

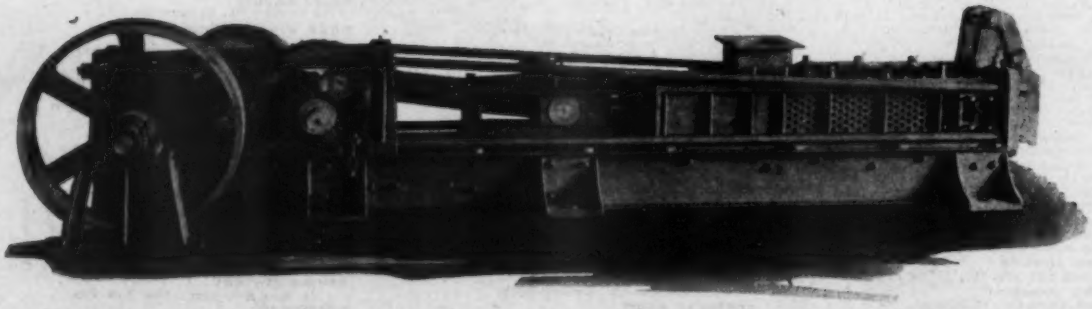
Oliver *Continuous* Filter Co.

San Francisco
503 Market St.

New York
33 W. 42nd St.

London
11-13 Southampton Row, W. C.

THE GIANT NEKOOSA BARK PRESS



This machine, driven by a 25 H. P. motor, presses wet spruce bark 52% bone dry, and wet hemlock bark 49% bone dry. This refuse is thereby turned into a good, usable fuel.

Nekoosa Motor & Machine Co.

Paper Mill Machinery, Iron, Brass and Sulphite Bronze Castings

NEKOOSA, WISCONSIN

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ENGINES
American Blower Co., Detroit, Mich.
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINES (Pumping)
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINES (Repairs)
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINES (Steam)
Hooven, Owens, Rentschler Co., Hamilton, O.

ENGINEERS
B. M. Baxter, Cleveland, O.
James L. Carey, Chicago.
George F. Hardy, New York City.
Hardy S. Ferguson, New York City.
Ferguson Engineers, Chicago.
Management Eng. & Dev. Co., Dayton, O.
V. D. Simons, Chicago.
Stebbins Engineering & Mfg. Co., Watertown, N. Y.
Jos. H. Wallace & Co., New York City.

ENGINEERS (Structural)
The Austin Co., Cleveland, O.

EVAPORATORS
Swenson Evaporator Co., Chicago.

EXHAUSTERS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.

FANS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O Ross Eng. Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

FELTS AND JACKETS
Appleton Woolen Co., Appleton, Wis.
Fitchburg Duck Mills, Fitchburg, Mass.
F. C. Huyck & Sons, Albany, N. Y.
Lockport Felt Co., Newfane, N. Y.
Shuler and Benninghofen, Hamilton, O.
Waterbury Felt Co., Skaneateles Falls, N. Y.

FELT AND WIRE GUIDES
Moore & White Co., Philadelphia.

FILTER (Continuous Suction)
Oliver Continuous Filter Co., Los Angeles, Calif.

FILTERS (Pressure and Gravity)
Hungerford & Terry, Inc., Clayton, N. J.
Norwood Eng. Co., Florence, Mass.
The Permutit Co., New York City.

FLAT WALL PAINT
Detroit Graphite Co., Detroit, Mich.

FLOUR SACK MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

FLUID METERS
Bailey Meter Co., Cleveland, O.

FLY BARS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

FOURDRINIER MACHINES
Smith & Winchester Mfg. Co., So. Windham, Conn.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Cheney Bigelow Wire Works, Springfield, Mass.
Eastwood Wire Mfg. Co., Belleville, N. J.
Lindsay Wire Weaving Co., Cleveland, O.
The W. S. Tyler Co., Cleveland, O.
Wisconsin Wire Works, Appleton, Wis.

FRICTION CLUTCHES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Moore and White Co., Philadelphia
A. Piamondon Mfg. Co., Chicago.
T. B. Wood's Sons Co., Chambersburg, Pa.

GAUGES (Pressure)
The Foxboro Co., Inc., Foxboro, Mass.

GAUGES (Liquid Level)
The Foxboro Co., Inc., Foxboro, Mass.

GEARS
Cleveland Worm Gear Co., Cleveland, O.
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Foote Bros. Gear & Machine Co., Chicago.
D. O. James Mfg. Co., Chicago.
Meisel Press Mfg. Co., Boston.
A. Piamondon Mfg. Co., Chicago
Robins Conveying Belt Co., New York City.

GEARS (Bakelite)
Foote Bros. Gear & Mach. Co., Chicago.

GEARS (Heavy Duty)
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

GEARS (Rawhide)
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

GEARS, REDUCTION
Moore Steam Turbine Corp., Wellsville, N. Y.

GEARS (Silent Chain)
Morse Chain Co., Ithaca, N. Y.

GEARS (Worm)
Cleveland Worm & Gear Co., Cleveland, O.

GENERATING SETS
Moore Steam Turbine Corp., Wellsville, N. Y.

GENERATORS (Turbo)
Moore Steam Turbine Corp., Wellsville, N. Y.

GLUES
E. F. Russ Co., Boston.

GRAB BUCKETS
The Brown Hoisting Mach. Co., Cleveland, O.
The Byers Mach. Co., Ravenna, O.
Industrial Works, Bay City, Mich.
Orton & Steinbrenner Co., Chicago

GRANITE ROLLS
Jones Bros. Co., Barre, Vt.

GREASE CUPS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Hunter Pressed Steel Co., Lansdale, Pa.

GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Holyoke Machine Co., Holyoke, Mass.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.

HAMMERS (Double Acting Steam Pile)
Industrial Works, Bay City, Mich.

HANGERS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

HEAT RESISTING PAINTS
Detroit Graphite Co., Detroit, Mich.
The Franklin Paint Co., Cleveland, O.

HEATERS (Open Steam)
Biggs Boiler Works Co., Akron, O.

HEATING SYSTEMS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
J. O. Ross Engineering Corp., New York City.
Skinner Bros. Co., St. Louis, Mo.

HOISTS (Electric)
Northern Eng. Works, Detroit, Mich.

HOISTING AND CONVEYING SYSTEMS
The Brown Hoisting Mach. Co., Cleveland, O.
Link-Belt Co., Chicago.
Northern Engineering Co., Detroit, Mich.

HOISTING AND MONORAIL SYSTEMS
The Brown Hoisting Machine Co., Cleveland, O
Northern Eng. Works, Detroit, Mich.

HOUSE PAINT
Detroit Graphite Co., Detroit, Mich.

HYDRAULIC TURBINES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.

INSTRUMENTS (Field Meter)
Bailey Meter Co., Cleveland, O.

INSTRUMENTS (Recording and Indicating)
The Foxboro Co., Inc., Foxboro, Mass.

IRON CASTINGS
Beloit Iron Works, Beloit, Wis.
Valley Iron Works Co., Appleton, Wis.

IRON FILLER
Detroit Graphite Co., Detroit, Mich.

IRON & STEEL SUPPLIES
Brown-Wales Co., Boston.

JORDAN ENGINES
Jones & Sons Co., E. D., Pittsfield, Mass.
Noble and Wood Mach. Co., Hoosick Falls, N. Y
Smith & Winchester Mfg. Co., So. Windham, Conn.
Shartle Bros. Machine Co., Middletown, O.

JORDAN FILLINGS
Jones & Sons Co., E. D., Pittsfield, Mass.
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
The Shartle Bros. Mach. Co., Middletown, O.
Taylor Wharton Iron & Steel Co., Highbridge, N. J.

JORDAN FILLINGS (Bronze)
American Manganese Bronze Co., Philadelphia.

KETTLES (Steam Jacketed)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., Cincinnati, O.

KNIVES
Simonds Mfg. Co., Fitchburg, Mass.

KRAFT AND SULPHATE PULPS
The Borregaard Co., Inc., New York City.

LABORATORY MACHINERY
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

LAYBOYS
Moore and White Co., Philadelphia.

LIGHT REFLECTING PAINT
Detroit Graphite Co., Detroit, Mich.

LIQUID CHLORINE
Mathieson Alkali Works, Inc., New York City.

LUBRICATING GRAPHITE
Detroit Graphite Co., Detroit, Mich.

LUBRICATING GREASE
Robins Conveying Belt Co., New York City.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.

MACHINE PAINTS
Detroit Graphite Co., Detroit, Mich.

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
B. F. Sturtevant Co., Hyde Park, Boston.

MECHANICAL PULP
J. Andersen & Co., New York City.
The Borregaard Co., Inc., New York City.

METAL PROTECTING PAINTS
Detroit Graphite Co., Detroit, Mich.

MILL ARCHITECTS
Stebbins Engineering & Mfg. Co., Watertown, N. Y.

MILL WHITE
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
St. Louis Surfacer & Paint Co., St. Louis, Mo.

NAVAL STORES
Hercules Powder Co., Wilmington, Del.

OIL CUPS
Hunter Pressed Steel Co., Lansdale, Pa.

OIL STORAGE SYSTEMS
Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.

PAINTS
Detroit Graphite Co., Detroit, Mich.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
St. Louis Surfacer & Paint Co., St. Louis, Mo.

PAPER BAG MACHINERY
Smith & Winchester Mfg. Co., So. Windham, Conn.

PAPER CUTTERS & SLITTERS
Beloit Iron Works, Beloit, Wis.
Hamblet Machine Co., Lawrence, Mass.
Meisel Press Mfg. Co., Boston, Mass.
Smith & Winchester Mfg. Co., South Windham, Conn.

PAPER EXPORTERS AND IMPORTERS
E. J. Keller Company, New York City.
Lagerlof Trading Co., New York City.

PAPER MACHINES
Bagley & Sewall Co., Watertown, N. Y.
Beloit Iron Works, Beloit, Wis.
The Black-Clawson Co., Hamilton, O.
Pusey & Jones Co., Wilmington, Del.
Smith & Winchester Mfg. Co., South Windham, Conn.
Valley Iron Works, Appleton, Wis.

PAPER MACHINE DRIVES
Harland Eng. Co., Montreal, Can.
Nordberg Mfg. Co., Milwaukee, Wis.
Westinghouse Elec. & Mach. Co., East Pittsburgh, Pa.

PAPER MANUFACTURERS
Eastern Manufacturing Co., New York City.
Hammermill Paper Co., Erie, Pa.
Marathon Paper Mills Co., Rothschild, Wis.
Munising Paper Co., Munising, Mich.
Nekoosa-Edwards Mfg. Co., Nekoosa, Wis.
Oxford Paper Co., New York City.
Ticonderoga Pulp & Paper Co., New York City.
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Montreal, Wis.

PAPER MANUFACTURERS' SUPPLIES
J. Andersen & Co., New York City.
The Borregaard Co., Inc., New York City.
Diamond Alkali Co., Pittsburgh.
E. J. Keller Company, New York City.
Mendelson Bros. Paper Stock Co., Chicago.
Paper Trading Co., Boston.
Pennsylvania Salt Mfg. Co., Philadelphia.
Perkins-Goodwin Co., New York City.
H. B. Wadsworth, New York City.

PAPER STOCK CUTTERS
Taylor, Stiles & Co., Riegelsville, N. J.

PAPER TESTERS
Tinius Olsen Testing Machine Co., Philadelphia.

PAPER AND PULP MILL BROKERS
Gibbs-Brower Co., New York City.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.

PENSTOCKS
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.
Ritter-Conley Co., Pittsburgh.

PERFORATED METALS
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, Jersey City, N. J.

PERFORATORS
Meisel Press Mfg. Co., Boston.

PILLOW BLOCKS
T. W. Wood's Sons Co., Chambersburg, Pa.

PILE DRIVERS
Industrial Works, Bay City, Mich.

PINIONS
Foote Bros. Gear & Mach. Co., Chicago.

PIPE JOINT CEMENT
Detroit Graphite Co., Detroit, Mich.

PIPE RIVETED STEEL
American Spiral Pipe Works, Chicago.
Chicago Bridge & Iron Wks., Chicago.
The Biggs Boiler Works, Akron, O.

PIPING EQUIPMENT
Pittsburgh Piping & Equip. Co., Pittsburgh.

PIPING SYSTEMS INSTALLED
Pittsburgh Piping & Equip. Co., Pittsburgh.

PIPE THREADING & CUTTING MACHINERY
Toledo Pipe Threading Machine Co., Toledo, O.

PNEUMATIC CHIP HANDLING SYSTEMS
Bayley Mfg. Co., Milwaukee, Wis.

POWER TRANSMISSION
The Carlyle Johnson Machine Co., Manchester, Conn.
Dodge Mfg. Co., Mishawaka, Ind.
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Link-Belt Co., Chicago.
D. O. James Mfg. Co., Chicago.
A. Piamondon Mfg. Co., Chicago.
Valley Iron Works, Williamsport, Pa.
T. B. Wood's Sons Co., Chambersburg, Pa.

PRESERVATIVE PAINTS
Detroit Graphite Co., Detroit, Mich.

PRINTING PRESSES
Meisel Press Mfg. Co., Boston.

PULLEYS
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

PULP (Chemical)
J. Andersen & Co., New York City.
The Borregaard Co., Inc., New York City.

"TOLEDOS"

will solve piping problems in your plant

An equipment of "Toledos" will handle any piping job that might arise in your plant and do it with the least labor, in the shortest time and with the smallest amount invested in the equipment.

"Toledos" are made for cutting or threading any size of pipe up to 12", and any one of the tools may be operated in any place the pipe may happen to be, and so easily one man can operate them without difficulty. These same portable hand tools can be connected to a "Toledo" Power Drive as shown in the illustration and converted instantly into the most efficient power machines.

"Toledo" equipment will prove its value in your plant, as it is in hundreds of others today.

A copy of our complete catalog will be sent on request.

This Trade Mark is your assurance of "Toledo" Quality. Be sure it is on the tools you buy.

THE TOLEDO PIPE THREADING MACHINE CO.

Toledo, Ohio — New York Office, 50 Church St.

Modern Methods

in our mills constitute one of the reasons for Appleton efficient service and fine quality.

The latest and most improved machinery with skilled workmen and the best wool obtainable, guarantee Appleton superiority.

Let us show you how Appleton Felts and Jackets will serve you better and longer. Write

APPLETON WOOLEN MILLS
Appleton, Wisconsin

Appleton
Felts and Jackets

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

E. J. Keller Company, New York City.
Lagerloef Trading Co., New York City.
Price & Pierce, Ltd., New York City.
The Pulp & Paper Trading Co., New York City.

PULP AND PAPER MILL MACHINERY
Beloit Iron Works, Beloit, Wis.
The Biggs Boiler Works Co., Akron, O.
The Black-Clawson Co., Hamilton, Ohio.
Carthage Mach. Co., Carthage, N. Y.
Davis, Frank H., Cambridge, Mass.
Dominion Engineering Works, Ltd., Montreal, Canada.
Glens Falls Machine Works, Glens Falls, N. Y.
Improved Paper Machinery Co., Nashua, N. H.
Moore & White Co., Philadelphia.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Noble & Wood Machine Co., Hoosick Falls, N. Y.
Pusey & Jones Co., Wilmington, Del.
Sandusky Fdy. & Mach. Co., Sandusky, O.
The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
Union Iron Works, Bangor, Me.
Valley Iron Works, Appleton, Wis.
Western Marine & Salvage Co., Alexandria, Va.

PULP GRINDERS
Glens Falls Machine Works, Glens Falls, N. Y.
Nekoosa Motor & Mach. Co., Nekoosa, Wis.
Union Iron Works, Bangor, Me.

PULP PRESSES
Southwork Foundry & Machine Co., Philadelphia.

PULP STONES
Smallwood-Low Stone Co., Lisbon, O.

PUMPS (Boiler Feed)
Moore Steam Turbine Corp., Wellsville, N. Y.

PUMPING MACHINERY
Hooven, Owens, Rentschler Co., Hamilton, O.

PUMPS (Stock)
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.
Glens Falls Machine Works, Glens Falls, N. Y.
Gregg Pump Co., Kansas City, Mo.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Centrifugal)
American Steam Pump Co., Battle Creek, Mich.
Aurora Pump & Mfg. Co., Aurora, Ill.
Buffalo Steam Pump Co., Buffalo, N. Y.
Cross, E. M., Mach. Co., Berlin, N. H.
DeLaval Steam Pump Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago.
Moore Steam Turbine Corp., Wellsville, N. Y.
Smith & Winchester Mfg. Co., So. Windham, Conn.

PUMPS (Deep Well)
Aurora Pump & Mfg. Co., Aurora, Ill.
A. D. Cook & Co., Inc., Lawrenceburg, Ind.
Gregg Pump Co., Kansas City, Mo.

PUMPS, TURBINE
Moore Steam Turbine Corp., Wellsville, N. Y.

PUMPS (Vacuum)
American Steam Pump Co., Battle Creek, Mich.
E. M. Cross Mach. Co., Berlin, N. H.
Nash Eng. Co., South Norwalk, Conn.

RAG AND PAPER DUSTERS
Holyoke Machine Co, Holyoke, Mass.
Norwood Eng. Co., Florence, Mass.

RECLAIMING MACHINERY
Swenson Evaporator Co., Chicago.

REDUCTION GEARS
Moore Steam Turbine Corp., Wellsville, N. Y.

REELS
Smith & Winchester Mfg. Co., So. Windham, Conn.

ROLLS (Rubber Covered)
B. F. Goodrich Co., Akron, Ohio.
Stowe & Woodward Co., Upper Newton Falls, Mass.

ROLLER BEARINGS
S. K. F. Industries, New York City.

ROOF DRYING SYSTEMS
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Eng. Corp., New York City.

ROOF PAINT
Detroit Graphite Co., Detroit, Mich.

ROPE DRIVES
The Falls Clutch & M. Co., Cuyahoga Falls, O.
Dodge Mfg. Co., Mishawaka, Ind.
T. B. Wood's Sons Co., Chambersburg, Pa.

ROTARY BLEACHING BOILERS
The Biggs Boiler Works Co., Akron, O.

ROZIN
Hercules Powder Co., Wilmington, Del.

RUST RESISTING PAINT
Detroit Graphite Co., Detroit, Mich.

RUBBER GOODS
Voorhees Rubber Mfg. Co., Jersey City, N. J.

SAVE-ALLS
Glens Falls Machine Works, Glens Falls, N. Y.

SAWS
Simonds Mfg. Co., Fitchburg, Mass.

SCALES
Fairbanks-Morse & Co., Chicago.

SCREENS
The Bagley & Sewall Co., Watertown, N. Y.
Union Iron Works, Bangor, Me.

SCREENS (Perforated Metal)
Hendrick Mfg. Co., Carbondale, Pa.
Charles Mundt & Sons, Jersey City, N. J.

SCREENS (Woven Wire)
The W. S. Tyler Co., Cleveland, O.

SCREEN PLATES
Central Mfg. Co., Kalamazoo, Mich.
William A. Hardy & Sons, Fitchburg, Mass.
Union Screen Plate Co., Fitchburg, Mass.

SHAFTING
The Falls Clutch & M. Co., Cuyahoga Falls, O.
T. B. Wood's Sons Co., Chambersburg, Pa.

SHOWER PIPES
Smith & Winchester Mfg. Co., So. Windham, Conn.

SHREDDERS
Gruendler Patent Crusher & Pulverizer Co., St. Louis, Mo.
Mitts & Merrill, Saginaw, Mich.

SILENT CHAIN DRIVES
The Link Belt Co., Chicago.
Morse Chain Co., Ithaca, N. Y.

SIZE
Western Paper Makers' Chemical Co., Kalamazoo, Mich.

SLITTING AND REWINDING MACHINERY
Beloit Iron Works, Beloit, Wis.
Cameron Machine Co., Brooklyn, N. Y.
Hamblet Machine Co., Lawrence, Mass.
Meisel Press Mfg. Co., Boston.
Samuel M. Langston Co., Camden, N. J.

SMOKE STACKS (Steel)
Chicago Bridge & Iron Wks., Chicago.
Littleford Bros., Cincinnati, O.

SOOT BLOWERS
Diamond Power Specialty Corporation, Detroit, Mich.

SODA ASH
Diamond Alkali Co., Pittsburgh.
Edw. Hill's Son & Co., New York City.
Wing & Evans, Inc., New York City.

SPECIAL MACHINERY
Nordberg Mfg. Co., Milwaukee, Wis.

SPEED CHANGES
Moore and White Co., Philadelphia.

SPEED REDUCERS
Foote Bros. Gear & Machine Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPEED REDUCTION UNITS
Cleveland Worm & Gear Co., Cleveland, O.
Foote Bros. Gear & Machine Co., Chicago.
D. O. James Mfg. Co., Chicago

SPEED TRANSFORMERS
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPIRAL GEARS
Foote Bros. Gear & Mach. Co., Chicago.
D. O. James Mfg. Co., Chicago.

SPIRAL PIPE
American Spiral Pipe Works, Chicago.

SPRAY NOZZLES
Buffalo Forge Co., Buffalo, N. Y.

SPROCKETS
Morse Chain Co., Ithaca, N. Y.

STEAM GENERATORS (Electric)
Electric Furnace Con. Co., Philadelphia.

STEAM TURBINES
Moore Steam Turbine Corp., Wellsville, N. Y.

STEEL PLATE CONSTRUCTION
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Littleford Bros., Cincinnati.
Biter-Conley Co., Pittsburgh.

STOCK CIRCULATING SYSTEM
Cladin Engineering Co., Lancaster, O.
Ticonderoga Machine Works, Ticonderoga, N. Y.

STOCK PUMPS
Beloit Iron Works, Beloit, Wis.
Buffalo Steam Pump Co., Buffalo, N. Y.

STORAGE TANKS (Steel)
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.
Littleford Bros., Cincinnati.
Biter-Conley Co., Pittsburgh.

STRAINERS
A. D. Cook, Inc., Lawrenceburg, Ind.

STRUCTURE STEEL PAINT
Detroit Graphite Co., Detroit, Mich.

STUFF CHESTS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.

STUFF PUMPS
Noble and Wood Mach. Co., Hoosick Falls, N. Y.
De Laval Steam Pump Co., Trenton, N. J.

SUCTION ROLLS
Sandusky Foundry & Machine Co., Sandusky, O.

SULPHITE (Strong Bleached and Easy Bleaching)
The Borregaard Co., Inc., New York City.

SULPHITE FITTINGS
Eastwood Wire Mfg. Co., Belleville, N. J.

SULPHITE MACHINERY
The Biggs Boiler Works Co., Akron, O.

SULPHUR
Union Sulphur Co., New York City.

SULPHUR BURNERS
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.

SUPERHEATERS
Power Specialty Co., New York City.

TACHOMETERS
The Foxboro Co., Inc., Foxboro, Mass.

TANKS (Iron and Steel)
The Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Works, Chicago.
Littleford Bros., Cincinnati.

TANKS (Oil)
Biggs Boiler Works Co., Akron, O.
Chicago Bridge & Iron Wks., Chicago.

TANKS (Paint)
Biggs Boiler Works Co., Akron, O.

TANKS (Jacketed)
Biggs Boiler Works Co., Akron, O.

TANKS (Wooden)
Hauser-Stander Tank Co., Cincinnati.
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.
Stevens Tank & Tower Co., Auburn, Me.

TANK PAINT
Detroit Graphite Co., Detroit, Mich.

TANKS AND TOWERS
Chicago Bridge & Iron Works, Chicago.
Stevens Tank & Tower Co., Auburn, Me.

THERMOMETERS (Recording and Indicating)
The Foxboro Co., Foxboro, Mass.

TOWERS (Loading and Unloading)
Robins Conveying Belt Co., New York City.

TRACTORS
The Holt Mfg. Co., Inc., Peoria, Ill.

TRANSMISSION MACHINERY
Dodge Mfg. Co., Mishawaka, Ind.
Foote Bros. Gear & Mach. Co., Chicago.
T. B. Wood's Sons Co., Chambersburg, Pa.
D. O. James Mfg. Co, Chicago

TURBINE (Steam)
Moore Steam Turbine Corp., Wellsville, N. Y.
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TURBINES (Hydraulic)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Holyoke Machine Co., Holyoke, Mass.
A. Piamondon Mfg. Co., Chicago.

UNIFLOW ENGINES
Nordberg Mfg. Co., Milwaukee, Wis.

VACUUM GAUGES
The Foxboro Co., Foxboro, Mass.

VACUUM PUMPS
The Nash Eng. Co., South Norwalk, Conn.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVE FACING TOOLS
The Draper Mfg. Co., Port Huron, Mich.

VALVES
The Crane Co., Chicago.
G. M. Davis Regulator Co., Chicago.
Eastwood Wire Mfg. Co., Belleville, N. J.
Jenkins Bros., New York City.
Lunkenheimer Co., The, Cincinnati.
The Wm. Powell Co., Cincinnati.

VALVES (Air Compressor)
Hooven, Owens, Rentschler Co., Hamilton, O.

VALVES (Digester)
Eastwood Wire Mfg. Co., Belleville, N. J.

VALVES (Throttle)
Hooven, Owens, Rentschler Co., Hamilton, O.

VAPOR ABSORPTION SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

VATS (Steel)
The Biggs Boiler Works Co., Akron, O.
Littleford Bros., Cincinnati.

VENTILATING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
J. O. Ross Engineering Corp., New York City.
B. F. Sturtevant Co., Hyde Park, Boston.

VULCANIZERS
Biggs Boiler Works Co., Akron, O.

WASHER WIRES
Eastwood Wire Mfg. Co., Belleville, N. J.
The W. S. Tyler Co., Cleveland, O.
Wisconsin Wire Works, Appleton, Wis.

WASTE PAPER STOCK
Mendelson Bros. Paper Stock Co., Chicago.

WATER FILTER
Glens Falls Machine Co., Glens Falls, N. Y.
Hungerford & Terry, Inc., Clayton, N. J.

WATER-SOFTENING AND PURIFYING SYSTEMS
The Permutit Co., New York City.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
Holyoke Machine Co., Holyoke, Mass.
A. Piamondon Mfg. Co., Chicago.

WET MACHINES
Glens Falls Machine Works, Glens Falls, N. Y.
Valley Iron Works Co., Appleton, Wis.
Smith & Winchester Mfg. Co., So. Windham, Conn.

WHEELS (Sprocket)
Robins Conveying Belt Co., New York City.

WOOD GRAPPLES
Industrial Works, Bay City, Mich.

WOOD PIPE
The Michigan Pipe Co., Bay City, Mich.
A. Wyckoff & Son Co., Elmira, N. Y.

WOOD PRESERVATIVES
Detroit Graphite Co., Detroit, Mich.

WORM DRIVES
Cleveland Worm & Gear Co., Cleveland, O.

WORM GEARS
Foote Bros. Gear & Mach. Co., Chicago.

WIRE SIGNS
Cheney Bigelow Wire Works, Springfield, Mass.

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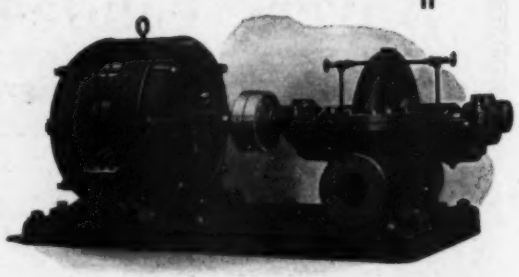

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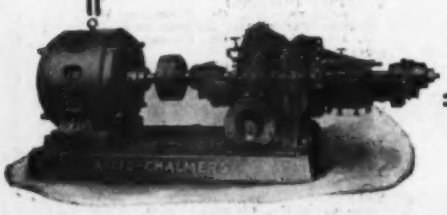

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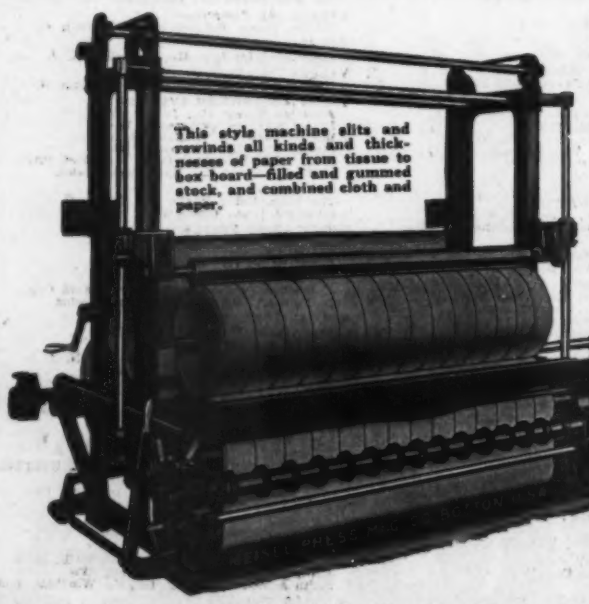

This style machine slits and rewinds all kinds and thicknesses of paper from tissue to box board—filled and gummed stock, and combined cloth and paper.

For Slitting and Rewinding This Is the BEST MACHINE Made

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Another prominent feature of this machine is its convenience. It has a device for separating the slitting cutter shafts to facilitate threading the paper through the machine. All adjustments necessary are made from the operator's place which is at the rewinding end of the machine.

The slitting cutters which are on parallel shafts give a clean, shear cut. The cutters may be quickly adjusted to different widths from 1¼ inch upward, and are clamped to the shafts with ample bearing surface so that they always run perfectly true.

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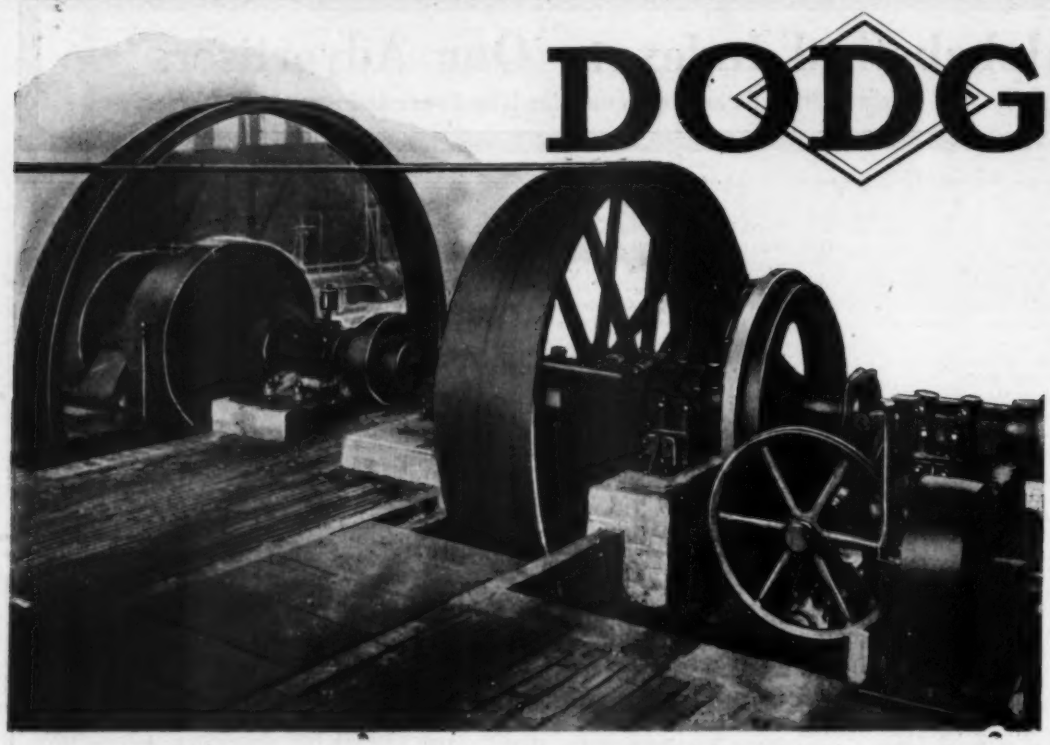

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